



lightsource bp

GOULBURN RIVER SOLAR FARM

Biodiversity Development Assessment Report

FINAL

May 2023



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Biodiversity Development Assessment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Lightsource bp

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Report No. 21507/R14
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QMS Certification Services

This report was prepared using
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Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Executive Summary

Umwelt was engaged by Lightsource Development Services Australia Pty Ltd (Lightsource bp), the Proponent, to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed Goulburn River Solar Farm (the 'Project'), located south-west of the township of Merriwa, NSW.

The Project is a State Significant Development (SSD), surrounded by the Goulburn River National Park. The Project will involve the construction, operation and decommissioning of a solar farm, which would generate approximately 550 MWp (Megawatt peak) of solar electricity, with a Battery Energy Storage System (BESS) of approximately 570 MWh (Megawatt hour) and an electrical substation to connect the solar farm to the existing 500 kV transmission line that runs through the Project Area.

This BDAR has been prepared by Umwelt to assess the potential biodiversity impacts of the Project in accordance with the Biodiversity Assessment Method (BAM).

Surveys identified the following Plant Community Types (PCTs) and vegetation which will be impacted by the Project:

- PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley (699.6 ha including 675.99 ha comprising derived native grassland).
- PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin (96.09 ha including 90.02 ha of derived native grassland).

The completion of surveys and assessments identified that the Project would impact the following threatened entities listed within the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- mapped important habitat for the Regent Honeyeater (*Anthochaera phrygia*) – listed as critically endangered under the BC Act and EPBC Act, and is an entity with the potential for serious and irreversible impact (SAII)
- Barking owl (*Ninox connivens*) (breeding and foraging habitat) – listed as vulnerable under the BC Act
- White-throated Needletail (*Hirundapus caudacutus*) – listed as vulnerable under the EPBC Act
- Glossy-black Cockatoo (*Calyptorhynchus lathami*) (foraging habitat only) – listed as vulnerable under the BC Act and EPBC Act
- Diamond Firetail (*Stagonopleura guttata*) – listed as vulnerable under the BC Act
- Dusky Woodswallow (*Artamus cyanopterus*) – listed as vulnerable under the BC Act
- Little Lorikeet (*Glossopsitta pusilla*) – listed as Vulnerable under the BC Act
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC) listed under the BC Act and the EPBC Act which is a potential serious and irreversible impact entity.

The following key impact avoidance and mitigation measures have been identified for the Project:

- Biodiversity impact avoidance through Development Footprint alterations which have resulted in biodiversity impact avoidance through an initial-avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further approximately 10% reduction in Development Footprint (882 ha to 799.5 ha).
- Selection of higher rated capacity solar panels to ensure that the Development Footprint is minimised, the Project retains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the Project's economic viability.
- Optimising opportunities to maintain connectivity between the Project Area and surrounding Goulburn River National Park and within the Project Area through limiting fencing to strategic areas.
- Redesign of the Project to minimise impacts on areas of mapped Regent Honeyeater important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to reduce impacts to suitable breeding habitat for the Barking Owl.
- Alteration of the Project to avoid impact to PCTs associated with habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*) and the Eastern Cave Bat (*Vespadelus troughtoni*).
- Reduction of the Development Footprint to avoid impacts to areas of PCT 1607 Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter.
- Reduction of the Development Footprint to avoid impacts to areas of PCT 1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin which corresponds to the Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion vulnerable ecological community (VEC).
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area, and the remnants of a historic Slab Hut of historic heritage importance.

Following the application of avoidance and mitigation measures, the following biodiversity credits are required to offset the impacts of the Project:

Entity	Credits Required
PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	4642 credits
1661 Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	136 credits
Regent Honeyeater (<i>Anthochaera phrygia</i>)	1546 credits
Barking Owl (<i>Ninox connivens</i>)	7 credits

Declaration

i. Certification under clause 6.15 Biodiversity Conservation Act 2016

I certify that this report has been prepared, to the best of my knowledge, based on the requirements of, and information provided under, the Biodiversity Assessment Method (2020) and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Name: Jacob Manners

Signature: A handwritten signature in black ink, appearing to read 'Jacob Manners', is written over a horizontal line.

Date: 2 May 2023

BAM Assessor Accreditation no: BAAS17099

Glossary

Term/Abbreviation	Definition
AIAPs	Additional impact assessment provisions for SAI
AOBV	Areas of Outstanding Biodiversity Value
Assessment Area	Includes the Development Footprint and the area of land within the 1500 m buffer zone surrounding the development footprint (or 500 m buffer for linear developments).
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BCD	Biodiversity, Conservation, and Science Division within NSW Department of Planning and Environment
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
BSA	Biodiversity Stewardship Agreement
CEEC	critically endangered ecological community
CEMP	Construction Environmental Management Plan
Development Footprint	The area of land that is directly impacted by a proposed development, the disturbance footprint.
Development Site	An area of land that is subject to a proposed development under the EP&A Act, including areas which will be retained and impacted by the project (synonymous with Subject Land and Project Area).
DBH	diameter at breast height over bark
DPE	Department of Planning and Environment (NSW)
DPIE	Department of Planning, Industry, and the Environment (NSW) (superseded, now DPE)
EAH	Environmental Agency Head
EC	ecological community listed under the EPBC Act
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EEC	endangered ecological community
EIS	Environmental Impact Statement
EPC	Engineering Procurement Contractor
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GIS	Geographic Information System

Term/Abbreviation	Definition
GPS	Global Positioning System
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS Act	<i>Local Land Services Act 2013 (NSW)</i>
MNES	matters of national environmental significance
MWh	Megawatt hour
MWp	Megawatt peak
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
NVR Mapping	Native Vegetation Regulatory Mapping
PCT	Plant Community Type
Project Area	The broader property area that the subject land is located within.
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
STVM	State Vegetation Type Map
Subject Land	The land subject to the development application (synonymous with development site). The Development Footprint/disturbance footprint is located within the Subject Land area.
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
The Project	The proposed Goulburn River Solar Farm. The Project includes the construction, operation and decommissioning of a solar farm with capacity of up to 550 MW, a 280 MWp and 570 MWh BESS and associated infrastructure.
TSSC	Threatened Species Scientific Committee – DCCEEW
VEC	vulnerable ecological community

Table of Contents

Executive Summary	i
Declaration	iii
Glossary	iv
1.0 Introduction	1
1.1 Overview	1
1.2 Purpose and Scope of this Report	1
1.3 Report Preparation	8
1.4 Proposed Development	9
1.4.1 Development Overview	9
1.4.2 Location and Subject Land Description	9
1.4.3 Proposed Development Description	9
1.4.4 Project Site Selection and Biodiversity Design Considerations	10
1.4.5 Other Documentation	11
1.5 Statutory Considerations	15
1.6 Biodiversity Offsets Scheme Entry	19
1.7 Excluded Impacts – NVR Mapping	21
1.8 Matters of National Environmental Significance	23
1.9 Information Sources	24
2.0 Methods	25
2.1 Site Context Methods	25
2.1.1 Landscape Features	25
2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods	25
2.2.1 Existing Information	25
2.2.2 Mapping Native Vegetation Extent	25
2.2.3 Plot-Based Vegetation Survey	26
2.2.4 Vegetation Integrity Survey	27
2.3 Threatened Flora Survey Methods	29
2.3.1 Review of Existing Information	29
2.3.2 BioNet Atlas Threatened Flora Records	29
2.3.3 Habitat Constraints Assessment	32
2.3.4 Field Surveys	32
2.4 Threatened Fauna Survey Methods	38

2.4.1	Review of Existing Information	38
2.4.2	BioNet Atlas Threatened Fauna Records	38
2.4.3	Habitat Constraints Assessment	42
2.4.4	Fauna Surveys	42
2.5	Threatened Fungi	50
2.6	Weather Conditions	50
2.7	Limitations	50
3.0	Site Context	51
3.1	Assessment Area	51
3.2	Landscape Features	51
3.2.1	IBRA Bioregions and IBRA Subregions	51
3.2.2	Rivers, Streams, Estuaries and Wetlands	51
3.2.3	Habitat Connectivity	51
3.2.4	Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance	52
3.2.5	Areas of Outstanding Biodiversity Value	52
3.2.6	NSW (Mitchell) Landscapes	52
3.2.7	Additional Landscape Features Identified in the SEARS	52
3.3	Native Vegetation Cover	52
4.0	Native Vegetation, Threatened Ecological Communities and Vegetation Integrity	55
4.1	Native Vegetation Extent	55
4.1.1	Changes to the Mapped Native Vegetation Extent	55
4.1.2	Areas That Are Not Native Vegetation	55
4.2	Plant Community Types	57
4.2.1	Overview of PCTs Present	57
4.2.2	Description of PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	60
4.2.3	Description of PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	66
4.2.4	Other PCTs Surveyed within the Project Area	70
4.2.5	Cleared Land and Waterbodies	70
4.3	Threatened Ecological Communities	71
4.4	Vegetation Zones	74
4.5	Vegetation Integrity (Vegetation Condition)	77
4.5.1	Vegetation Integrity Survey Plots	77

4.5.2	Scores	77
4.5.3	Use of Benchmark Data	77
5.0	Habitat Suitability for Threatened Species	78
5.1	Identification of Threatened Species for Assessment	78
5.1.1	Ecosystem Credit Species	78
5.1.2	Species Credit Species	82
5.2	Presence of Candidate Species Credit Species	93
5.2.1	Threatened Flora Species	93
5.2.2	Threatened Fauna Species	93
5.3	Threatened Species Surveys	95
5.4	Expert Reports and of More Appropriate Local Data	99
5.4.1	Results for BC Act Listed Species Credit Entities	99
5.4.2	Results for BC Act Listed Ecosystem Credit Species	107
5.4.3	Results for EPBC Act Listed Species	107
5.5	SEPP (Biodiversity and Conservation) 2021	108
6.0	Identifying Prescribed Impacts	109
7.0	Avoid and Minimise Impacts	111
7.1	Avoid and Minimise Direct and Indirect Impacts	111
7.1.1	Project Location	111
7.1.2	Project Design and Planning	114
7.2	Avoid and Minimise Prescribed Impacts	116
7.2.1	Project Location	117
7.2.2	Project Design	117
7.3	Other Measures Considered	117
7.3.1	Do Nothing Option	117
7.4	Summary of Measures to Avoid and Minimise Impacts	117
8.0	Impact Assessment	120
8.1	Direct Impacts	120
8.1.1	Residual Direct Impacts	120
8.1.2	Change in Vegetation Integrity Score	122
8.2	Indirect Impacts	123
8.3	Prescribed Impacts	125
8.3.1	Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance	125
8.3.2	Human Made Structures	125
8.3.3	Non-Native Vegetation	125

8.3.4	Excluded Areas – Category 1 Exempt Land	126
8.3.5	Habitat Connectivity	126
8.3.6	Waterbodies, Water Quality and Hydrological Processes	127
8.3.7	Vehicle Strikes	127
8.4	Mitigating Residual Impacts – Management Measures and Implementation	128
8.4.1	Workforce Education and Training	128
8.4.2	Implementation of Vegetation Protection Zones for Areas to be Retained	128
8.4.3	Ecologist Pre-Clearance Surveys and Supervision of Works	129
8.4.4	Erosion and Sedimentation Control	129
8.4.5	Weed Management	129
8.4.6	Fencing, Access Control and Fauna Exclusion	130
8.4.7	Preparation and Implement of Construction Environmental Management Plan	130
8.5	Adaptive Management Strategy for Uncertain Impacts (Where Relevant)	135
9.0	Serious and Irreversible Impacts	136
9.1	Assessment for Serious and Irreversible Impacts on Biodiversity Values	136
9.1.1	Additional Impact Assessment Provisions for TECs at Risk of an SAll	139
9.1.2	Additional Impact Assessment Provisions for Threatened Species at Risk of an SAll	148
10.0	Impact Summary	155
10.1	Determining an Offset Requirement for Impacts	155
10.1.1	Impacts on Native Vegetation and TECs (Ecosystem Credits)	155
10.1.2	Impacts on Threatened Species and their Habitat (Species Credits)	157
10.1.3	Indirect and Prescribed Impacts	157
10.2	Impacts That Do Not Need Further Assessment	157
11.0	Biodiversity Credit Report	159
11.1	Ecosystem Credits	159
11.2	Species Credits	161
11.3	Biodiversity Offset Strategy	161
12.0	References	162

Figures

Figure 1.1	Site Map	12
Figure 1.2	Location Map	13
Figure 1.3	Development Layout	14
Figure 1.4	Biodiversity Values Map	20
Figure 1.5	Native Vegetation Regulatory Map	22
Figure 2.1	Field Survey Locations – BAM Plot Locations	28
Figure 2.2	Threatened Flora Survey Locations	37
Figure 2.3	Threatened Fauna Survey Locations	49
Figure 3.1	Rivers, Streams, Estuaries, and Wetlands Downstream of the Subject Land	53
Figure 3.2	Habitat Connectivity	54
Figure 4.1	Native vegetation extent	56
Figure 4.2	Plant Community Types and Vegetation Zones	59
Figure 4.3	Threatened Ecological Communities on the Development Footprint	73
Figure 5.1	Regent Honeyeater Species Polygon	101
Figure 5.2	Barking Owl Species Polygon	104
Figure 5.3	Other species observation locations	106
Figure 7.1	Impact Avoidance and Minimisation Areas	113
Figure 8.1	Final Impact Areas on the Development Footprint	121
Figure 9.1	Locations of Habitat for Potential Serious and Irreversible Impact Entities	138
Figure 9.2	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC Impact Avoidance	146
Figure 9.3	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC NSW Extent	147
Figure 9.4	Regent Honeyeater Impact Avoidance	154
Figure 10.1	Thresholds for Assessing and Offsetting Impacts	158

Tables

Table 1.1	SEARs Relevant to the Biodiversity Assessment	2
Table 1.2	Accredited BAM Assessors and their role on this Project	8
Table 1.3	Legislation Relevant to the Project	15
Table 2.1	Plant Community Type Survey Plot Stratification Details	27
Table 2.2	BioNet Atlas Threatened Flora Records within 10 km	30
Table 2.3	Candidate Threatened Flora Species Targeted and Field Survey Methods Used	34
Table 2.4	BioNet Atlas Threatened Fauna Records within 10 km	39
Table 2.5	Details of Diurnal Threatened Fauna Surveys Completed	43
Table 2.6	Details of Nocturnal Threatened Fauna Surveys Completed	47
Table 2.7	Details of Remote Detection Threatened Fauna Surveys Completed	48
Table 3.1	Native Vegetation Cover in the Assessment Circle	52
Table 4.1	Plant Community Types Identified within the Development Footprint	58
Table 4.2	Overview of PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley Characteristics	60

Table 4.3	Overview of PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin Characteristics	66
Table 4.4	TECs within the Development Footprint	72
Table 4.5	Vegetation Condition Zones and patch sizes	75
Table 4.6	Vegetation Integrity Condition Scores	77
Table 5.1	Predicted Ecosystem Credit Species	79
Table 5.2	Predicted Flora Species Credit Species	83
Table 5.3	Predicted Threatened Fauna Species Credit Species	87
Table 5.4	Determining the Presence of Candidate Flora Species Credit Species on the Development Footprint	93
Table 5.5	Determining the Presence of Candidate Fauna Species Credit Species on the Development Footprint	94
Table 5.6	Summary of Species Credit Threatened Flora Surveys Completed	95
Table 5.7	Summary of Species Credit Threatened Fauna Surveys Completed	96
Table 5.8	Regent Honeyeater Species Polygon Details	99
Table 5.9	Barking Owl Species Polygon Details	102
Table 5.10	Ecosystem Credit Species Observation Details	107
Table 5.11	Results for EPBC Act Listed Species Present (recorded within the Development Footprint)	107
Table 5.12	Koala Feed Tree Present within Project Area	108
Table 6.1	Prescribed Impacts Identified	109
Table 7.1	Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts	118
Table 8.1	Summary of Residual Direct Impacts	120
Table 8.2	Impacts to Vegetation Integrity	122
Table 8.3	Summary of Residual Indirect Impacts	123
Table 8.4	Summary of Proposed Mitigation and Management Measures for Residual Impacts (Direct, Indirect, and Prescribed)	131
Table 8.5	Implementation Details for Proposed Impact Mitigation and Management Measures	133
Table 9.1	Entities at Risk of an SAI	137
Table 9.2	SAI Impact Assessment – Box White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CECC	139
Table 9.3	All Impact Assessment – Regent Honeyeater	148
Table 10.1	Impacts that Do Not Require Offset – Ecosystem Credits	155
Table 10.2	Impacts that Require an offset – Ecosystem Credits	156
Table 10.3	Impacts that Require an Offset – Species Credits	157
Table 11.1	Ecosystem Credit Class and Matching Credit Profiles	159
Table 11.2	Species Credit Class and Matching Credit Profiles	161

Appendices

Appendix A	EPBC Act Matters of National Environmental Significance Report
Appendix B	BAM Compliance Table
Appendix C	BAM Vegetation Integrity Data
Appendix D	BAM Calculator Reports

1.0 Introduction

1.1 Overview

Lightsource Development Services Australia Pty Ltd (Lightsource bp) has engaged Umwelt (Australia) Pty Ltd (Umwelt) to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed Goulburn River Solar Farm (the Project) within the locality of Merriwa, NSW.

The Project includes the following two main components for the purposes of assessment under the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a):

- A Solar Farm.
- Public Road and Culvert Upgrade Works.

Two separate BDARs have been prepared as the Solar Farm requires a site-based assessment and the public road and culvert upgrade works require a linear-based assessment under the BAM. This BDAR assesses the impacts associated with the proposed Solar Farm.

1.2 Purpose and Scope of this Report

This BDAR has been prepared as part of the Environmental Impact Statement (EIS) documentation for the Project to address the Secretary's Environmental Assessment Requirements (SEARs) in relation to biodiversity for the proposed Solar Farm (refer **Table 1.1**). This report provides an assessment of the biodiversity values of the Development Footprint, documents the application of the avoid, minimise and offset framework and assesses the likely biodiversity impacts of the Project. Umwelt has prepared a separate Biodiversity Development Assessment Report (BDAR) for the public road and culvert upgrade component of the Project (See Appendix 7 of the EIS).

This BDAR has been prepared in accordance with the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a). The Project is a State Significant Development (SSD) under Division 4.7 of Part 4 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and is therefore required to be accompanied by a BDAR in accordance with Section 7.9 of the BC Act.

The Project requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The BAM has been endorsed as the assessment method for Matters of National Environmental Significance under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act. Nationally listed threatened species, threatened ecological communities (TECs) and migratory species have been considered and assessed as part of this BDAR.

Table 1.1 SEARs Relevant to the Biodiversity Assessment

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
SEARs		
Biodiversity	An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values	The BDAR itself
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM	Section 7.0 and Section 8.0 of this BDAR
	An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts, and	Appendix 7 of the EIS
	If an offset is required, details of the measures proposed to address the offset obligations.	Section 11.3 of this BDAR
Biodiversity Conservation Division (BCD) Submission		
Biodiversity	1. Biodiversity impacts related to the proposed development (SSD-33964533) are to be assessed in accordance with the Biodiversity Assessment Method 2020 and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the <i>Biodiversity Conservation Act 2016</i> (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method 2020.	The BDAR itself.
	2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method 2020.	Section 7.0 and Section 8.0 of this BDAR.
	3. The BDAR must include details of the measures proposed to address the offset obligation as follows. <ul style="list-style-type: none"> • The total number and classes of biodiversity credits required to be retired for the development/project. • The number and classes of like-for-like biodiversity credits proposed to be retired. • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules. • Any proposal to fund a biodiversity conservation action. • Any proposal to conduct ecological rehabilitation (if a mining project). • Any proposal to make a payment to the Biodiversity Conservation Fund. 	Section 11.0 of this BDAR.

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
	If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	
	4. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the <i>Biodiversity Conservation Act 2016</i> .	Section 1.3 of this BDAR.
EPBC Act Assessment Requirements – supplementary SEARs		
General requirements – Relevant regulations	5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) and all matters outlined below in relation to the controlling provisions.	Appendix A of this BDAR.
General requirements – Project description	6. The title of the action, background to the action and current status.	Appendix A of this BDAR.
	7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	Appendix A of this BDAR.
	8. How the action relates to any other actions that have been or are being taken in the region affected by the action.	Appendix A of this BDAR.
	9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	Section 1.4 of this BDAR.
General requirements – Impacts	<p>10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including:</p> <ul style="list-style-type: none"> • a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts. • a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible. • analysis of the significance of the relevant impacts; and • any technical data and other information used or needed to make a detailed assessment of the relevant impacts. 	Appendix A of this BDAR.

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
General requirements – Avoidance, mitigation, and offsetting	<p>11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:</p> <ul style="list-style-type: none"> • a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, • any statutory policy basis for the mitigation measures. • the cost of the mitigation measures. • an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing. • the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program. 	<p>Section 7.0 and Appendix A of this BDAR.</p>
	<p>12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.</p>	<p>Appendix A of this BDAR.</p>
	<p>13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any:</p> <ul style="list-style-type: none"> • conservation advice or recovery plan for the species or community • relevant threat abatement plan for the species or community • wildlife conservation plan for the species; and • any strategic assessment. <p>Note: the relevant guidelines and policy statements for each species and community are available from the Department of the Environment Species Profiles and Threats Database. (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl)</p>	<p>Appendix A of this BDAR.</p>
	<p>14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15–17.</p>	<p>Appendix A of this BDAR.</p>

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
Biodiversity (threatened species and communities and migratory species)	15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	Appendix A of this BDAR.
	16. For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate: <ul style="list-style-type: none"> • description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; • details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; • description of the relevant impacts of the action having regard to the full national extent of the species or community's range; and • description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; • identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; • a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established. • details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and • details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites. 	Appendix A of this BDAR. Impact avoidance measures are also described in Section 7.0 .

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
	<p>Note: For the purposes of approval under the EPBC Act, it is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action and deliver an overall conservation outcome that improves or maintains the viability of the MNES i.e., 'like for like'. In applying the BAM, residual impacts on EPBC Act listed TECs must be offset with Plant Community Type(s) (PCT) that are ascribed to the specific EPBC listed ecological community. PCTs from a different vegetation class will not generally be acceptable as offsets for EPBC listed communities.</p> <p>17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. (http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.)</p>	
<p>Appendix A Protected matters relevant to the Goulburn River Solar Farm (EPBC 2021/9102) project</p>	<p>Based on the information in the referral documentation, the location of the action, species records and likely habitat present in the area, there are likely to be significant impacts to:</p> <ul style="list-style-type: none"> • White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered. • Regent Honeyeater (<i>Anthochaera phrygia</i>) – Critically Endangered. <p>Additionally, there is some risk that there may be significant impacts on the following matters and further assessment to determine if the communities and species listed below are present in the proposed action area and, if so, the extent to which they may be impacted by the proposed action, is required:</p> <ul style="list-style-type: none"> • Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered. • Swift Parrot (<i>Lathamus discolor</i>) – Critically Endangered. • Painted Honeyeater (<i>Grantiella picta</i>) – Vulnerable. • Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>) – Vulnerable. • Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>) – Vulnerable. • Pink tailed Worm-lizard (<i>Aprasia parapulchella</i>) – Vulnerable. • Bluegrass (<i>Dichanthium setosum</i>) – Vulnerable. • <i>Homoranthus darwinoides</i> – Vulnerable. <p>Several threatened species and ecological communities have been identified as priority management species following the 2019–2020 bushfires. This includes the White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland threatened ecological community and the Regent.</p>	<p>Appendix A of this BDAR.</p>

Key Issues	Secretary's Environment Assessment Requirements	Where addressed
	<p>Honeyeater (as discussed above), and the following listed species that may be impacted by the proposed action:</p> <ul style="list-style-type: none"> • Koala (<i>Phascolarctos cinereus</i>) (Combined Population of QLD, NSW and the ACT) – Vulnerable. • Greater Glider (<i>Petauroides Volans</i>) – Vulnerable. • Brush tailed Rock wallaby (<i>Petrogale penicillata</i>) – Vulnerable. • Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (<i>Dasyurus maculatus maculatus</i>) (South-east mainland population)) – Endangered. • New Holland Mouse, Pookila (<i>Pseudomys novaehollandiae</i>) – Vulnerable. • Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) – Vulnerable. <p>Further analysis of the impacts of the fires on those species and communities identified above should be undertaken during the assessment.</p> <p>Note: uncertainty around the extent and number of protected matters that may be impacted will need to be resolved through the assessment process once final alignment and construction plans have been completed.</p> <p>Note: this may not be a complete list and it is the responsibility of the proponent to ensure any protected matters under these controlling provisions are assessed for the Commonwealth decision-maker's consideration.</p>	

1.3 Report Preparation

This BDAR was prepared by Jacob Manners (Senior Ecologist) with review and technical direction from Rachel Musgrave (NSW Ecology Manager – Sydney / Principal Ecologist) and Allison Riley (Ecology Manager Southeast Australia / Principal Ecologist). The BDAR was prepared in accordance with the BAM, following the specific requirements detailed within Appendix K of the BAM (see **Appendix B**).

Table 1.2 outlines the details of the ecologists involved in the survey, calculations and reporting for the Project.

Table 1.2 Accredited BAM Assessors and their role on this Project

Name	Experience / Qualifications	BAM Accreditation Number	Contribution to the project
Jacob Manners	MWldMgt, BSc	BAAS17099	Biodiversity Assessment Project Manager, Accredited assessor, BAM plots, PCT mapping and threatened species surveys
Allison Riley	BSc	BAAS17042	Document Review / Technical Project Director to Dec 2022
Rachel Musgrave	Bsc (Hons)	BAAS18032	Document Review / BAM Plots / Technical Project Director from Dec 2022
Patricia Robinson	BEnvSc	BAAS18123	Threatened flora surveys / BAM Plot Surveys
Belinda Howe	BEnvScMgt	BAAS21019	Threatened species surveys
Sarah Hart	MSc, BSc, Dip EnvMgt	BAAS21026	Threatened species surveys and BAM Plots
Rebecca Vere	MEnvMgt, Bsc(Hons)	-	Threatened species surveys
Joel Callaghan	BSc (Hons)	-	Threatened species surveys and PCT Mapping
Matthew Mullaney	BEnvSc	-	Threatened species surveys and BAM Plots
Jarmin Thornberry	BEnvScMgt Dip CLMgt	-	Threatened species surveys and BAM Plots
William Brown	BEnvScMgt	-	Threatened species surveys
Alex Cottle	BEnvScMgt	-	Threatened species surveys
Kate Faber	BEnvScMgt	-	Threatened species surveys

1.4 Proposed Development

1.4.1 Development Overview

The Project is a proposed solar farm which includes construction, operation, maintenance and eventually decommissioning works. The solar farm is proposed to generate approximately 550 MWp (Megawatt peak) of solar electricity, with a Battery Energy Storage System (BESS) of approximately 570 MWh (Megawatt hour) and an electrical substation to connect the solar farm to the existing 500 kV transmission line that runs through the Project Area.

1.4.2 Location and Subject Land Description

The Goulburn River Solar Farm is located approximately 28 kilometres (km) southwest of the township of Merriwa and is surrounded by the Goulburn River National Park. It is within the Upper Hunter Local Government Area (LGA) of New South Wales (NSW). The boundary of the Project Area and Development Footprint is shown on the Site Map provided as **Figure 1.1** and the Location Map, provided as **Figure 1.2**.

The elevated central parts of the Project Area are located on the Liverpool West Basalt rock unit, with surrounding areas on the Banks Wall Sandstone rock unit, which is part of the Narrabeen Group sandstones (Colquhoun *et al.*, 2021). The areas influenced by the Liverpool West Basalt rock unit are highly productive and have been historically cleared and continue to be utilised for livestock grazing on improved pastures.

The current site vegetation consists of a mosaic of exotic dominated pasture vegetation where pasture improvement has taken place, derived native grasslands subject to various degrees of disturbance in various timeframes, isolated paddock trees, areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

1.4.3 Proposed Development Description

The Development Footprint and Project Area are mapped in **Figure 1.3**. The key components of the Project include:

- Approximately one million bifacial solar PV modules in an east-west single-axis tracking arrangement with an average height of approximately 3.1 m at full tilt, and with a maximum of 4 m in some areas due to undulating site topography.
- A BESS with an approximate 280 MWp and 570 MWh capacity. The BESS would most likely comprise of a lithium phosphate iron battery system, to be housed in a series of outdoor containers, aggregated in one central location. The BESS would be located adjacent the substation in the south east corner of the Project Area.
- Onsite 500 kV switchyard and substation, with underground electrical conduits and cabling leading into the yard and overhead lines reaching above to the existing transmission line. An additional tower may be erected on the current line to accommodate the grid connection.
- Onsite power line connection via underground electrical conduits and cabling.
- Communications tower, up to 30 m high, providing communications, radio and cellular services to the site and wider region.

- Internal access roads allowing for site maintenance.
- Site office and operations and maintenance building with parking for the operations team.
- Primary solar farm site access point from the existing driveway from Wollara Road, with additional existing access points to be maintained along the north-western boundary of the Project Area for emergency use.
- Drainage line crossings if and where required to manage existing surface water flows (to be determined during further design development) and access points for construction purposes.
- Security fencing around the three discrete Development Footprint areas, installation of crossing gates, water tanks or dams, and fencing and potential alternate secondary access points to facilitate ongoing livestock grazing.

1.4.4 Project Site Selection and Biodiversity Design Considerations

The following design considerations have been factored into the selection of the Development Footprint and biodiversity impact avoidance:

- The Project Area was selected for the location of a solar farm due to the presence of an existing 500 kV transmission line, which means that there will be no requirement for a new electricity transmission line or associated impacts. To ensure that the Project remains economically viable the total capacity of solar production needs to remain at or above a 550 MWp of solar electricity.
- The Project Area is also characterised by suitable terrain and topography, high quality solar irradiance and ideal climatic conditions and access to major transport networks for delivery of construction materials. There is only one surrounding land holder (the NSW Government) and the visual impacts associated with the Project can be managed through the screening provided by the Goulburn River National Park.
- The Project Area (2000 ha) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Throughout the EIS preparation and scoping phases of the Project several design refinements have occurred including:

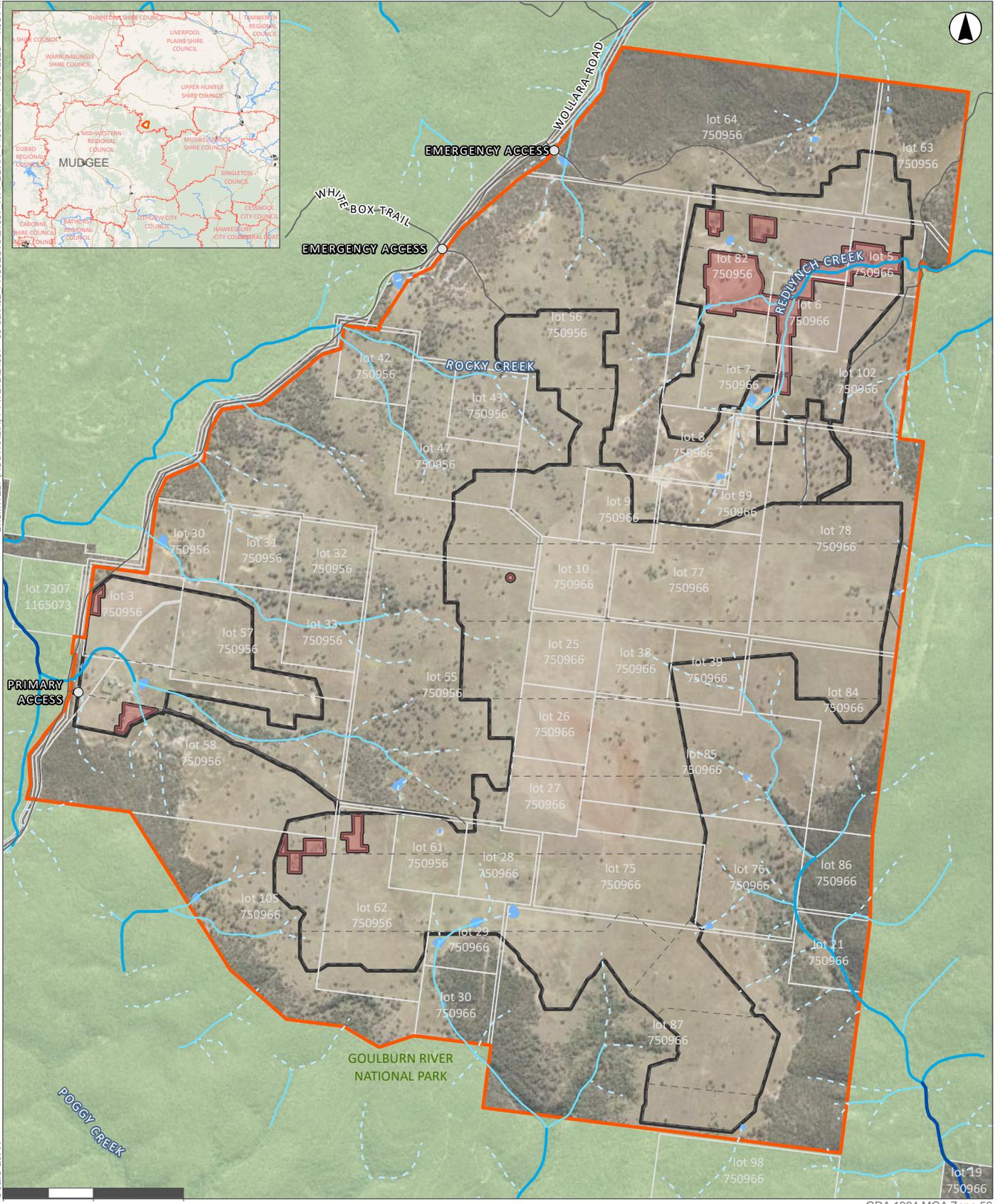
- Development Footprint alterations have resulted in biodiversity impact avoidance through an initial avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further secondary approximately 10% reduction in Development Footprint (882 ha to 799.5 ha).
- Selection of higher rated capacity solar panels to ensure that the Development Footprint is minimised, the Project obtains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the Project's economic viability.
- Optimising opportunities to maintain connectivity between the Project Area and surrounding Goulburn River National Park and within the Project Area through limiting fencing to strategic areas.

- Redesign the Project to minimise impacts on areas of mapped Regent Honeyeater (*Anthochaera phrygia*) important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to reduce impacts to suitable breeding habitat for the Barking Owl (*Ninox connivens*).
- Alteration of the Project to avoid impact to Plant Community Types (PCTs) associated with habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*) and the Eastern Cave Bat (*Vespadelus troughtoni*).
- Reduction in the area occupied by the Project for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as critically endangered under both the BC Act and EPBC Act) to avoid areas of woodland with intact crown condition and resulting in impact minimisation to areas to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area, and the remnants of a historic Slab Hut of historic heritage importance.

1.4.5 Other Documentation

Other information sources relied upon are referenced in the text and are listed in the References Section of this Report (**Section 12.0**).

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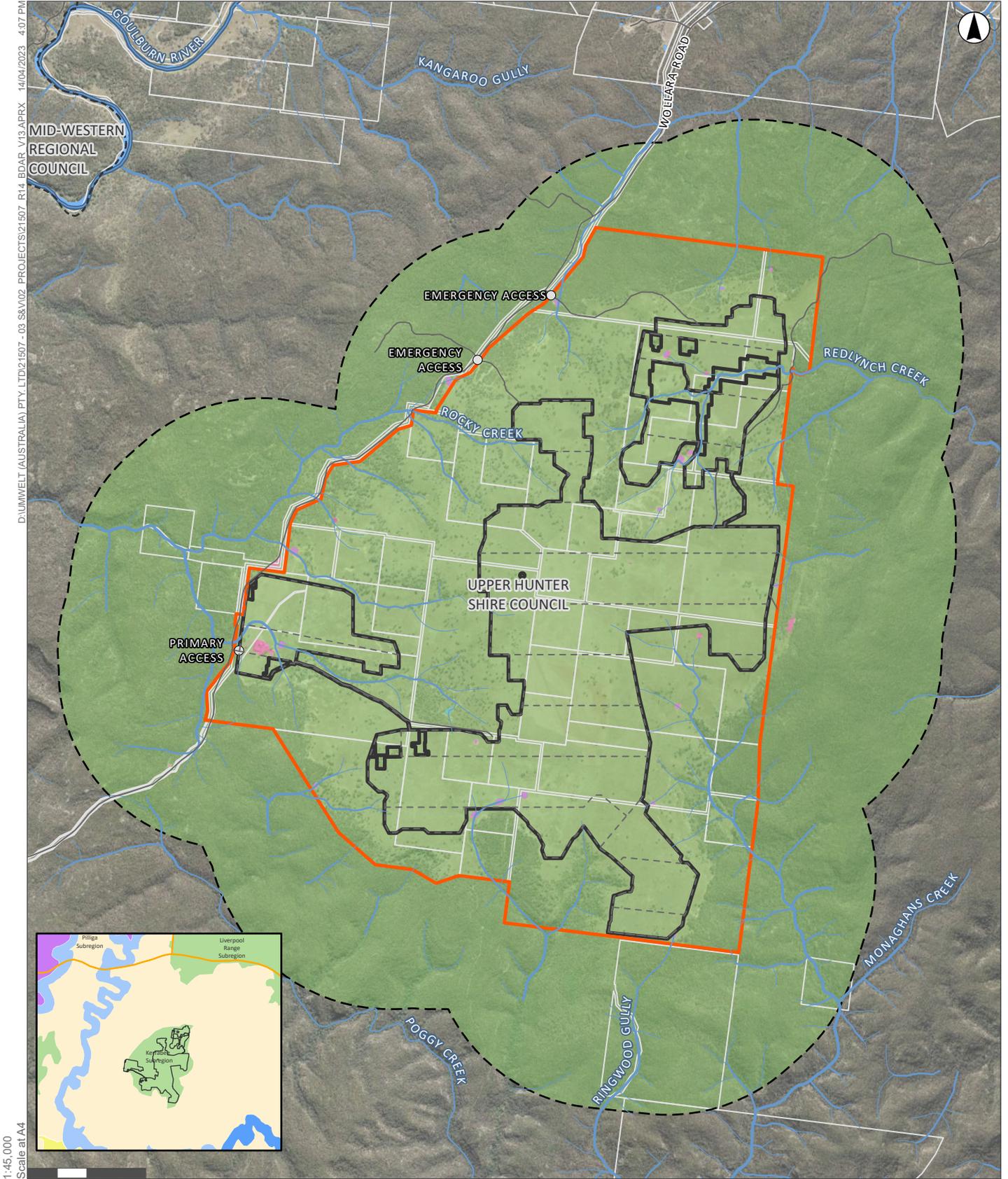
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GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Property Boundaries
 - ▭ Project Area
 - ▭ NSW National Parks
 - ▭ Development Footprint
 - ▭ Exclusion Zones - Environmentally Sensitive Areas

- Stream Order**
- 1st Order Stream
 - 2nd Order Stream
 - 3rd Order Stream
 - 4th Order Stream

FIGURE 1.1
Site Map



1:45,000
Scale at A4

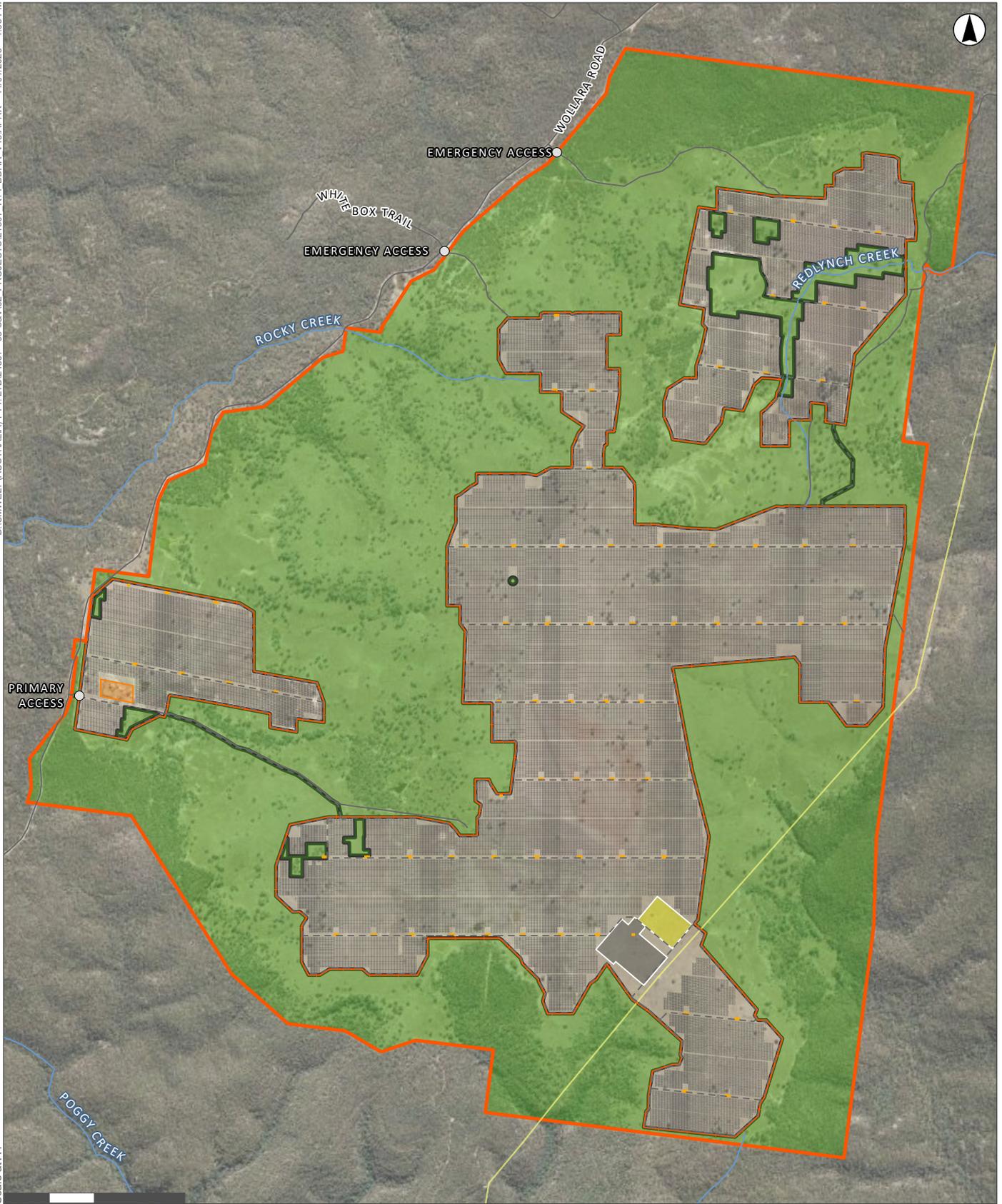
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GDA 1994 MGA Zone 56

Legend

- Access Points
- - Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- 1500m Buffer Area (Total extent = 4586.84 ha)
- Property Boundaries
- Development Footprint
- Project Area
- IBRA Regions
- Native Vegetation Extent (Total Area = 4569.17 ha / 99.61% of Assessment Area)
- Non-native / Cleared Land (Total Area = 17.67 ha)
- Mitchell Landscapes**
- Goulburn River Channels and Floodplains
- Lees Pinch Foothills
- Liverpool Range Valleys and Footslopes

FIGURE 1.2
Location Map



- Legend**
- | | |
|-------------------------------------|---------------------------------|
| ○ Access Points | ▬ Development Footprint |
| - - Proposed Access Tracks | ▬ Project Area |
| — Existing Roads and Tracks | ■ Battery Energy Storage System |
| — Electricity Transmission Line | ■ Battery Substation |
| — Security Fence | ■ Inverters |
| — Watercourse | ■ Compound Area |
| ■ Retained / Impact Avoidance Areas | |

GDA 1994 MGA Zone 56

FIGURE 1.3
Development Layout

1.5 Statutory Considerations

Commonwealth and State legislation relevant to this BDAR is described in **Table 1.3**.

Table 1.3 Legislation Relevant to the Project

Relevant legislation	Governing Agency	Summary
Commonwealth legislation		
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	<p>The EPBC Act is the Commonwealth Government’s primary piece of environmental legislation and is administered by the Australian Government DCCEEW. It is designed to protect national environmental assets, known as MNES, which include threatened species of flora and fauna, endangered ecological communities, and migratory species, as well as other protected matters. It defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of recovery plans for threatened flora, fauna, and communities.</p> <p>Preliminary investigations identified that the Project would likely have a significant impact on biodiversity protected under the EPBC Act. A referral was subsequently prepared and submitted, with the Project being determined to be a controlled action (ref 2021/9102) under the EPBC Act on 2 February 2022. The controlled action included the requirement for the Proposal to be assessed by an accredited assessment under EP&A Act. The Proposal will be assessed under the Bilateral Agreement between the Commonwealth and NSW, which will then be used to inform the Commonwealth Environment Minister’s determination. The Commonwealth Assessment Requirements and where this BDAR addresses each requirement are summarised in Table 1.1.</p>
NSW legislation		
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	Department of Planning and Environment (DPE)	<p>The EP&A Act is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values, as listed in the NSW BC Act and NSW <i>Fisheries Management Act 1994</i> (FM Act).</p> <p>Section 4.36 of the EP&A Act provides for the declaration of a project as SSD. Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a State Environmental Planning Policy (SEPP) or by the Minister for Planning and Homes.</p> <p>Clause 20 of Schedule 1 of Planning Systems SEPP prescribes that development for the purpose of ‘electricity generating works’ that has a capital investment value of more than \$30 million is SSD. The Project has a capital investment value of greater than \$30 million.</p>

Relevant legislation	Governing Agency	Summary
		<p>As SSD, the Proposal would be assessed under Part 4 Division 4.7 section 4.36 of the EP&A Act. The Minister for Planning and Homes is the consent authority for SSD. The Minister (or the Minister’s delegate) is required to take into consideration the matters listed under section 4.15 of the EP&A Act when determining the development application (DA).</p> <p>Under Division 4.4 section 4.39 an EIS is required to accompany a DA that has been determined as SSD. The proponent is required to consult with the Secretary of DPE with regard to the matters to be addressed in the EIS. These are referred to as the SEARs. The SEARs for the Project were issued by DPE on 1 February 2021. Broadly, the SEARs require biodiversity impacts related to all stages of a proposal to be assessed in accordance with section 7.9 of the BC Act and documented in a BDAR. The SEARs and where this BDAR addresses each requirement pertaining to biodiversity are summarised in Table 1.1.</p>
<p><i>Biodiversity Conservation Act 2016</i> (BC Act)</p>	<p>DPE</p>	<p>The BC Act and its supporting regulations commenced on 25 August 2017. The BC Act sets out the environmental impact assessment framework for threatened species, TECs and Areas of Outstanding Biodiversity Value (formerly critical habitat) for Major Projects, Part 5 activities, and local development.</p> <p>The BC Act provides a framework to avoid, minimise and offset the impacts of proposed development and established a methodology for assessing the likely impacts on biodiversity values and calculating measure to offset those impacts (the BAM).</p> <p>Sections 7.9 of the BC Act requires that SSD under Part 4 of the EP&A Act that triggers the Biodiversity Offset Scheme (BOS) must be accompanied by a BDAR prepared by an accredited assessor in accordance with the BAM.</p>
<p>Biodiversity Conservation Regulation 2017 (BC Regulation)</p>	<p>DPE</p>	<p>The BC Regulation commenced on 25 August 2017. The object of the BC Regulation is to make provision for matters that are required or authorised to be prescribed as a consequence of the enactment of the BC Act. The BC Regulation provides the thresholds which trigger the BOS, the principles for consideration of serious and irreversible biodiversity impacts, rules for meeting a biodiversity offset obligation, biodiversity certification criteria, additional biodiversity impacts to which the scheme applies and compliance provisions for unauthorised clearing and accredited assessors. This BDAR has been prepared in accordance with the provisions of the BC Regulation.</p>
<p><i>National Parks and Wildlife Act 1974</i> (NPW Act)</p>	<p>DPE</p>	<p>The NPW Act provides for the protection of Aboriginal sites and designated conservation areas as well as the flora and fauna within conservation areas. The objective of the NPW Act is to consolidate and amend the law relating to the establishment, preservation and management of national parks, historic sites, certain other areas, and the protection of certain fauna, native plants and Aboriginal objects.</p> <p>Goulburn River National Park, listed under the NPW Act, surrounds the Project Area.</p>

Relevant legislation	Governing Agency	Summary
<i>Fisheries Management Act 1994</i> (FM Act)	Department of Primary Industries (DPI)	<p>The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. More detailed objectives relevant to the Project include:</p> <ul style="list-style-type: none"> • to conserve fish stocks and key fish habitats • to conserve threatened species, populations and ecological communities of fish and marine vegetation • to promote ecologically sustainable development, including the conservation of biological diversity. <p>An Aquatic Assessment which includes an assessment of the likely impacts on listed aquatic threatened species, populations and ecological communities under the FM Act is provided in Appendix 7 of the EIS.</p>
<i>Biosecurity Act 2015</i>	DPI	<p>The Biosecurity Act replaced the <i>Noxious Weeds Act 1993</i> on 1 July 2017. The Biosecurity Act is a wide-ranging legislation that outlines the requirements of government, councils, private landholders, and public authorities in the management of biosecurity matters. Priority weeds are regulated under the Biosecurity Act with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.</p>
<i>Local Land Services Act 2013</i> (LLS Act)	Local Land Services (LLS)	<p>The LLS Act, supported by the Local Land Services Regulation 2014 (LLS Regulation), established 11 regional Local Land Services organisations to provide biosecurity, natural resources management and agricultural advisory services.</p> <p>Under Part 5A of the LLS Act and the supporting regulation, a Native Vegetation Regulatory (NVR) map showing the extent of categorised land in NSW is to be published by the Environment Agency Head. The NVR map underpins the legislative framework for native vegetation clearing in rural areas by categorising land in NSW. However, the map applies only to the following zones (if they are not in an excluded LGA): Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU5 Primary Production Small Lots and Zone RU6 Transition.</p> <p>Currently, various map categories have been released under staged transitional arrangements. The online NVR map viewer currently displays Excluded Land, Category 2 – Vulnerable Land and Category 2 – Sensitive Land. Category 1 – Exempt Land and Category 2 – Regulated Land maps have not yet been released. During the transition period landholders must determine if their land is Category 1 or Category 2 under the LLS Act.</p> <p>The BAM does not need to be applied to land mapped as Category 1 – Exempt Land. Portions of the Development Footprint have been mapped as Category 1 – Exempt Land on the extract of the Draft Native Vegetation Regulatory map, provided by the NSW Government for this Project.</p>

Relevant legislation	Governing Agency	Summary
<p>State Environmental Planning Policy (Biodiversity and Conservation) 2021</p>	<p>DPE</p>	<p>SEPP (Biodiversity and Conservation) 2021 commenced in March 2022 and includes a number of previous planning policies including Koala Habitat Protection 2019 and Koala Habitat Protection 2021, Chapter 3 and 4, respectively. Schedule 2 identifies that the provisions of chapters 3 and 4 apply in the Upper Hunter LGA. For all RU1 (Primary Production), RU2 (Rural Landscape) or RU3 (Forestry) zoned land outside of the Sydney Metropolitan Area and Central Coast, Chapter 3 Koala Habitat Protection 2020 applies.</p> <p>Chapter 3 aims to encourage the proper conservation and management of areas of natural vegetation that may provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. This is to be achieved through identifying areas of core Koala habitat, including these areas in environment protection zones and where required managing development consent in relation to areas of core Koala habitat.</p> <p>An assessment of impacts to Koalas under the SEPP (Biodiversity and Conservation) is provided in Section 5.5.</p>

1.6 Biodiversity Offsets Scheme Entry

The Biodiversity Offset Scheme (BOS) applies to all SSD Projects and the SEARS require a BDAR to be prepared for the Project in accordance with Section 7.9 of the BC Act. The Development Footprint also includes mapped Biodiversity Values areas on the Biodiversity Values Map, as shown in **Figure 1.4**.

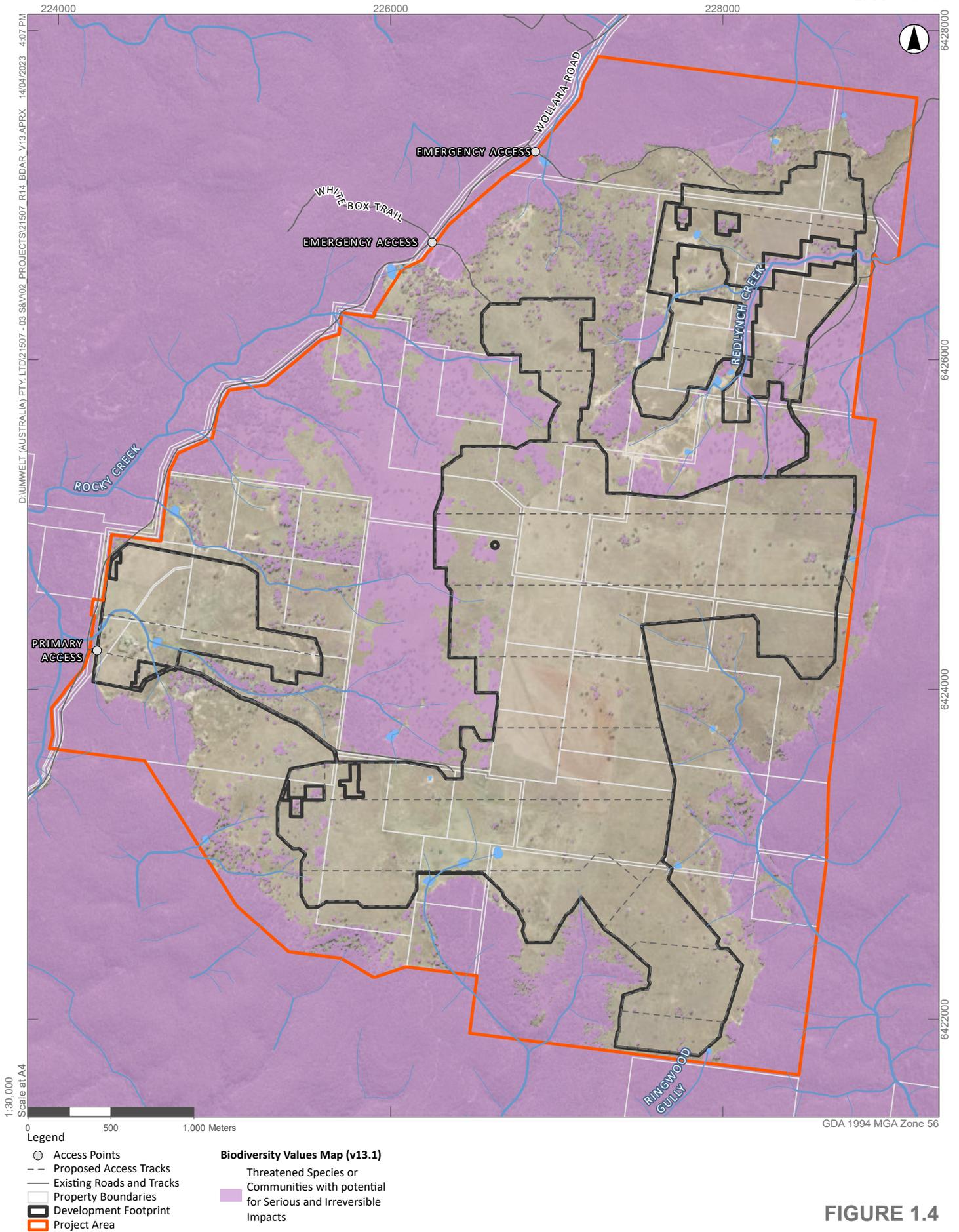


FIGURE 1.4

Biodiversity Values Map

1.7 Excluded Impacts – NVR Mapping

The BC Act (at Clause 6.8(3)) specifies that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1-Exempt Land (as defined in Part 5A of the Local Land Services Act 2103 (LLS Act)), other than prescribed impacts (as defined in clause 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation)).

The NSW Government has undertaken a transitional approach and period to the release of the Native Vegetation Regulatory (NVR) Map which currently includes not releasing final mapping of areas of Category 1 Exempt Land.

The assessment of Category 1 Land under the BAM during this transitional period has been dealt with in BAM Assessor Updates (No. 22 6 September 2019 and No. 3 6 August 2018). The guidance provided identified that accredited assessors were responsible for determining areas of Category 1 Land for developments affecting rural land. These areas were identified as not requiring impact assessment offset calculations relating to vegetation integrity and habitat suitability.

Umwelt initially completed a desktop assessment to determine areas of Category 1 Exempt Land within the Project Area and found that areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC was represented within areas of Category 1 land within the Development Footprint. These areas were primarily composed of highly degraded grazing paddocks. The LLS Act identifies that Category 1 Exempt Land excludes land mapped by the Environment Agency Head (EAH) as land containing a CEEC under the BC Act. Umwelt identified that no areas of CEEC vegetation mapped by the EAH occurred within the Project Area.

Umwelt's Land Categorisation Assessment Report was sent to the Biodiversity Conservation and Science Division (BCD) within DPE for review on 29 September 2022. A request for the NSW Government's full draft NVR mapping was also forwarded to BCD and the Map Review Team on this date. No correspondence was received in relation to the 29 September 2022 email request or a follow request on 7 November 2022.

During December 2022 the DPE released the guide "*Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme*". This document updated the NSW Government's advice on Category 1 Land mapping and CEECs, and provides advice that CEECs and critically endangered species of plants are designated as Category 2 – sensitive regulated land (clause 108(2)(b), LLS Regulation), noting that state-wide comprehensive mapping both entities is not currently published, and that a complete a site-based floristic assessment is required to confirm the presence or absence of CEECs and/or critically endangered plants for any reasonable assessment of NVR map land category.

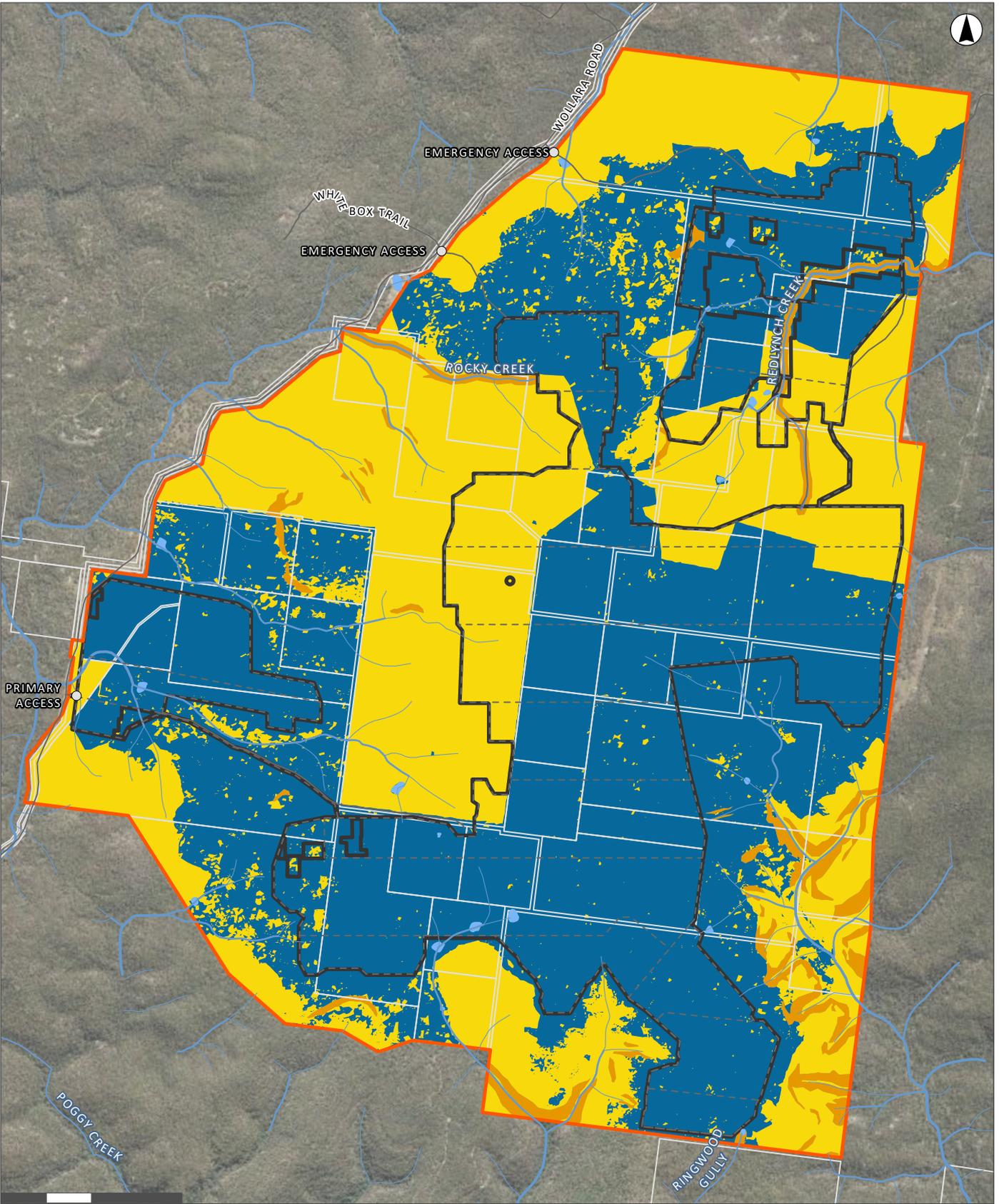
Umwelt submitted another request to the Map Review Team in March 2023 requesting the draft NVR mapping for the Project Area and obtained a raster copy of the map layer on 24 March 2023. A copy of this map is provided as **Figure 1.5**.

For the purposes of this assessment, areas of derived native grassland that meet the final determination of the White Box - Yellow Box - Blakeley's Red Gum Woodland and Derived Native Grassland CEEC listed under the BC Act, have been considered Category 2 – Sensitive Land as per the current advice from DPE. Areas of derived native grassland occurring within areas of Category 1 – Exempt Land as mapped on **Figure 1.5** and which do not conform to a CEEC, have been assessed as Category 1 – Excluded Land.



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Scale at A4



GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - ▭ Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area
- Draft Native Vegetation Regulatory Map (DPE 2023)**
- Category 1 - exempt land
 - Category 2 - regulated land
 - Category 2 - vulnerable regulated land

FIGURE 1.5

**Draft Native Vegetation
Regulatory Map**

1.8 Matters of National Environmental Significance

The Project has been determined to be a Controlled Action and requires approval under the EPBC Act. DCCEEW have identified that based on the information in the referral documentation, the location of the action, species records and likely habitat in the area, there are likely to be significant impacts to:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – critically endangered ecological community.
- Regent Honeyeater – critically endangered.

DCCEEW has also identified that there is some risk that there may be significant impacts on the following further matters and further assessment is required to determine if the following communities and species are present in the proposed action area and if so, the extent to which they may be impacted by the proposed action:

- Central Hunter Valley Eucalypt Forest and Woodland – critically endangered
- Swift Parrot (*Lathamus discolor*) – critically endangered.
- Painted Honeyeater (*Grantiella picta*) – vulnerable.
- Large-eared Pied Bat – vulnerable.
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – vulnerable.
- Pink tailed Worm-lizard (*Aprasia parapulchella*) – vulnerable.
- Bluegrass (*Dichanthium setosum*) – vulnerable.
- Homoranthus darwinioides – vulnerable.

DCCEEW has also requested further analysis of the impacts of the 2019–2020 bushfires on the following species as part of this assessment:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – critically endangered ecological community.
- Regent Honeyeater (*Anthochaera phrygia*) – critically endangered.
- Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – vulnerable.
- Greater Glider (*Petauroides volans*) – vulnerable.
- Brush tailed Rock wallaby (*Petrogale penicillata*) – vulnerable.
- Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – endangered.
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – vulnerable.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – vulnerable.

Table 1.1 in Section 1.2 details the assessment requirements associated with the Controlled Action determination.

The BAM has been endorsed as the assessment method for Matters of National Environmental Significance under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act. Nationally listed threatened species, TECs and migratory species have been considered and assessed as part of this BDAR. A separate MNES assessment addressing the requirements of the Project Assessment Notes provided by DCCEEW is included in **Appendix A**.

1.9 Information Sources

The following guidance documents and resources relevant to the preparation of this BDAR were reviewed:

- Biodiversity Assessment Method (NSW DPIE 2020a).
- Biodiversity Assessment Method Operational Manual – Stage 1 (NSW DPIE 2020b).
- Biodiversity Assessment Method Operational Manual – Stage 2 (NSW DPIE 2019).
- Biodiversity Assessment Method (BAM) Calculator User Guide (NSW OEH 2017).
- NSW Bionet including the Bionet Atlas, Bionet Vegetation Database and Threatened Species Data Collection (TBCD) (NSW DPE 2023a).
- Guidance for the Biodiversity Development Assessment Report Template (including the template) (NSW DPE 2022).
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (NSW DPIE 2020c).
- Flora Species with Specific Survey Requirements List Version 1 (NSW DPIE 2020d).
- ‘Species Credits’ threatened bats and their habitats (NSW OEH 2018b).
- NSW Survey Guide for Threatened Frogs (NSW DPIE 2020e).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (NSW DEC 2004).

Other information sources relied upon are referenced in the text and are listed in the References Section of this report (**Section 12.0**).

2.0 Methods

2.1 Site Context Methods

2.1.1 Landscape Features

Landscape feature such as Interim Biogeographic Regionalisation for Australia (IBRA) bioregions, IBRA subregions and NSW (Mitchell) Landscape regions, native vegetation extent within a 1500 m buffer area, cleared areas, rivers, streams, wetlands and connectivity features were identified within the Assessment Area where appropriate in accordance with Section 3.1.3 of the BAM (DPIE 2020a). Determination of the 'Site Context' was calculated by assessing the native vegetation cover and patch size within the Development Footprint in accordance with Section 3.2 and Subsection 4.3.2 of the BAM, respectively (DPIE, 2020a).

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods

2.2.1 Existing Information

The following existing information was reviewed to inform the identification of PCTs (**Section 4.2**) and TECs (**Section 4.3**):

- NSW State Vegetation Type Map: Upper Hunter Version 1.0 (NSW OEH, 2019).
- Notice and Reason for the Final Determination for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (NSW Threatened Species Scientific Committee 2020a).
- Conservation Assessment of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (NSW Threatened Species Scientific Committee 2020b).
- EPBC Act Policy Statement 3.5 – White Box - Yellow Box - Blakely's Red Gum grassy woodlands and derived native grasslands (AGDEH 2006a).
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community Species List (AGDEH 2006b).
- Commonwealth Listing Advice on White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (AGDEH 2006c).

2.2.2 Mapping Native Vegetation Extent

The native vegetation extent within the Development Footprint was determined during site surveys, through Geographic Information Systems (GIS) mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and PCT mapping was undertaken using best-practice techniques to delineate vegetation communities across the Development Footprint. Vegetation mapping involved the following key steps:

- Review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography.
- Review of the modelled distribution of vegetation communities within broader scale regional based vegetation mapping.
- Preparation of a draft PCT map based on interpretation of digital aerial imagery.
- Field-based ground-truthing of the draft PCT mapping.
- Confirmation of vegetation community floristic delineations based on plot data.

Vegetation communities were delineated through the identification of patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other communities.

The extent of native ground-cover vegetation within offsite areas where a canopy of native trees was absent, was estimated based on the visual interpretation of aerial imagery including areas of cultivation and fence boundaries. Native vegetation extent mapping offsite is broad-scale and completed for the purposes of estimation of native vegetation cover under the BAM (DPE, 2020a).

2.2.3 Plot-Based Vegetation Survey

A stratified plot-based floristic vegetation survey of the Development Footprint was undertaken in accordance with Table 3 and Section 4.2.1 of the BAM to assess the expected environmental variation and address any gaps and verify the results of previous mapping and site information.

The BAM plots were sampled by Umwelt ecologists on the following dates:

- 3 February 2022
- 21–25 March 2022
- 5–7 April 2022
- 15–16 June 2022
- 30 January–2 February 2023.

BAM plot survey stratification for each plant community type is listed in **Table 2.1**.

Table 2.1 Plant Community Type Survey Plot Stratification Details

PCT ID	PCT name	Vegetation Condition Zone	Area (ha)	Quantity of Plots Required (BAM 2020 Table 3)	Plots Completed in 2022/23
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered Trees	23.64	4	5
		Moderate Condition Derived Native Grassland	168.48	6	18
		Moderate to Low Condition Derived Native Grassland	308.37	7	19
		Low Condition Derived Native Grassland	199.14	5	10
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07	3	4
		Moderate to Low Condition Derived Native Grassland	36.79	4	11
		Low Condition Derived Native Grassland	53.24	5	5

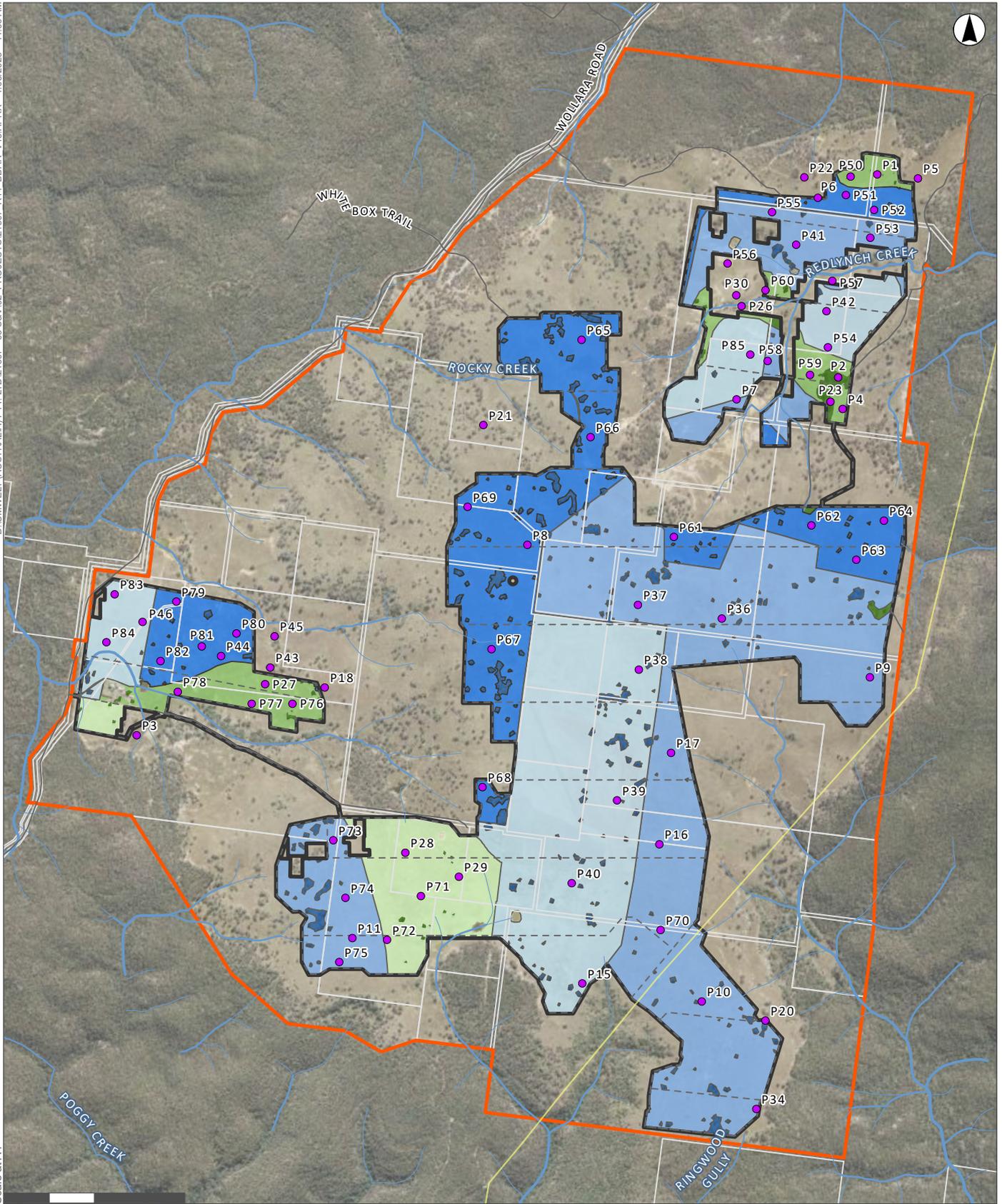
Each BAM plot consisted of a 20x20 m floristic plot nested within each 20x50 m vegetation integrity plot. Plot locations were recorded with a hand-held Global Positioning System (GPS) device and are shown in **Figure 2.1**. All vascular plants recorded within floristic plots were identified using keys and nomenclature in Plantnet NSW Flora Online Identification Keys (The Royal Botanic Gardens and Domain Trust 2023).

The floristic survey data collected included the survey data requirements identified in Table 1 of the BAM. The plot survey effort was completed to ensure compliance with the stratification requirements of Table 3 of the BAM. Plot locations were selected to ensure that they captured attributes relevant to each vegetation condition zone. Plots were established to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone. Plots were positioned to avoid locations on ecotones, tracks (their edges) and/or small disturbed areas generally inconsistent with the target vegetation zone (e.g., small patches of bare ground).

At each plot, approximately 45 to 60 minutes was spent searching for all vascular flora species present within the 20 x 20 m floristic plot. Searches were generally undertaken through parallel transects from one side of the plot to another. Most efforts were spent examining the groundcover, which consistently supported well over half of the species present. The tree canopy and tree trunks were searched for mistletoes, vines, and epiphytes.

2.2.4 Vegetation Integrity Survey

As part of the plot-based vegetation survey, native vegetation composition, structure and function attributes identified in Section 4.3.4 of the BAM were assessed for each BAM plot. The locations of the plots sampled are mapped to scale and shown as BAM Plots in **Figure 2.1**.



- Legend**
- Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Electricity Transmission Line
 - Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area
 - BAM Plots

- Plant Community Types and Condition Zones**
- PCT 483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley**
- Low Condition Derived Native Grassland
 - Moderate to Low Condition Derived Native Grassland

- Moderate Condition Derived Native Grassland
 - Scattered Trees
- PCT 1661 - Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin**
- Low Condition Derived Native Grassland
 - Moderate to Low Condition Derived Native Grassland
 - Scattered Trees

FIGURE 2.1

Field Survey Locations - Vegetation Plots

2.3 Threatened Flora Survey Methods

2.3.1 Review of Existing Information

The following existing information was reviewed to inform the threatened flora species surveys and assessment of habitat constraints and microhabitats:

- DPE BAM Calculator (BAM-C) (available online to accredited BAM assessors).
- Threatened flora records held on the NSW BioNet Atlas of NSW Wildlife within the Assessment Area (NSW DPE 2022a).
- Vegetation associations reports for the Sydney Basin IBRA bioregion – Kerrabee IBRA sub-region for each PCT present to determine threatened fauna species PCT associations.
- Habitat constraints listed in the TBDC (NSW DPE 2022c).
- BAM Flora species with specific survey requirements spreadsheet (NSW DPIE 2020d).

2.3.2 BioNet Atlas Threatened Flora Records

Details of the threatened flora species recorded on the BioNet Atlas within 10 km of the Project Area are summarised in **Table 2.2**.

Table 2.2 BioNet Atlas Threatened Flora Records within 10 km

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded	Number of Records within 10 km	Likelihood of Occurrence	Comments
<i>Commersonia rosea</i> (<i>Androclava rosea</i>)	-	E	E	01/03/2005	1	Low potential for occurrence in PCT 1661 only.	Occurs on skeletal sandy soils in scrub and heath. Recorded on the BioNet Atlas adjacent to Project Area on western side of Wollara Road. No associated PCTs are present within the Development Footprint and the habitats present are not likely to support this species.
<i>Cymbidium canaliculatum</i>	<i>Cymbidium canaliculatum</i> population in the Hunter Catchment	E Pop.	-	01/11/2021	50	Moderate potential for occurrence in PCT 483.	Denatured records mapped mostly south of the Goulburn River.
<i>Dichanthium setosum</i>	Bluegrass	V	V	06/06/2019	1	Not likely to occur.	Single record from Merriwa Plain approx. six km north of the Project Area. Not known from within the Sydney Basin Bioregion.
<i>Diuris tricolor</i>	Pine Donkey Orchid	V	-	14/10/2012	114	Low potential for occurrence in PCT 1661 only.	Denatured records mapped mostly south of the Goulburn River, none in close proximity to the Project Area.
<i>Eucalyptus camaldulensis</i>	<i>Eucalyptus camaldulensis</i> population in the Hunter catchment	E Pop.	-	01/10/2010	11	Not likely to occur	Local records are south of the Goulburn River, none in close proximity to the Project Area. No associated PCTs present and no habitats present which are likely to support this species.
<i>Homoranthus darwinioides</i>	Fairy Bells	V	V	28/10/2021	49	Moderate potential for occurrence in PCT 1661.	Recorded in the Goulburn River National Park in sandstone habitats adjoining the Project Area

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded	Number of Records within 10 km	Likelihood of Occurrence	Comments
<i>Ozothamnus tessellatus</i>	-	V	V	23/11/2019	66	Low potential for occurrence	Local records are south of the Goulburn River and the Project Area is considered to be outside of this species range.
<i>Pomaderris queenslandica</i>	Scant Pomaderris	E	-	03/11/2014	5	Moderate potential for occurrence in PCT 1661.	Local records are south and north-west of the Project Area.
<i>Tylophora linearis</i>		V	E	05/09/2014	1	Not likely to occur.	One record south of the Goulburn River, no records directly adjacent to the Project Area.

2.3.3 Habitat Constraints Assessment

The following field-based surveys were undertaken to assess the habitat constraints for the candidate threatened flora species:

- Field searches for habitat constraints identified from the desktop review of the TBDC.
- Direct observation of the quality and suitability of micro-habitats present.
- Collection of rapid flora assessments for each PCT to assess the condition of the habitats present on 9–12 August 2021.
- Collection of site photographs to assess the condition of habitats present.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the confirmed candidate threatened species assessment in the BAM-C. Where species presence could not be ruled out in accordance with Section 5.2 of the BAM, surveys were conducted. The species credit species predicted to occur on the Development Footprint and justifications for ruling species out from further survey and assessment are identified in **Table 5.2** in **Section 5.1.2.1** and **Table 5.3** in **Section 5.1.2.2** below.

2.3.4 Field Surveys

Searches for threatened flora species were completed in accordance with the NSW Survey Guide, *'Surveying threatened plants and their habitats'* (DPIE 2020c) and any relevant species requirements listed in the TBDC (NSW DPE 2022a). Details of the field survey methods used and species targeted are listed in **Table 2.3** and the locations of the surveys completed are mapped in **Figure 2.2**.

Surveys for threatened flora were completed within the following PCTs:

- PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley.
- PCT 1607 Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter.
- PCT 1661 Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin.
- PCT 1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin.

Impacts to PCT 1607 and PCT 1655 were avoided through design changes which were implemented following the completion of surveys and these PCTs are now outside of the Development Footprint.

Survey groups 1 and 2 were surveyed on the same dates. The traverses for these survey groups have not been mapped separately, however a 10 m wide parallel traverse was applied for Group 1 and a 20 m parallel traverse was applied for Group 2 species.

Grid-based searches were completed for Survey Group 5 over an area of >50 ha. The grid-based searches were targeted to areas with preferred microhabitats for *Cymbidium canaliculatum*. *Cymbidium canaliculatum* is an epiphytic orchid species which takes advantage of the decaying heartwood of eucalypt trees. Searches for this species targeted substrates such as stumps, logs and trees providing potential habitat.

Monotaxis macrophylla was also targeted during habitat searches on a precautionary basis, however it is considered that the Development Footprint is too disturbed to support this species. *Monotaxis macrophylla* is a 'fire ephemeral' species associated with rocky ridge and hillside microhabitats in a diversity of associated vegetation types (DPE 2023). The BioNet Atlas identifies that the species should be targeted for surveys within six months of disturbance by fire as it is a short-lived annual, and will not be present unless a recent disturbance/fire event has occurred and triggered germination. BioNet Atlas strongly recommends expert report to discount presence or absence, or detection by soil seed analysis. It is considered that the microhabitats required are not present (rocky ridges) and the Development Footprint is too degraded to support this species due to historical clearing, pasture improvement and altered fire regimes. This species is fire dependent and fire has been largely excluded from the Development Footprint through fuel load reduction associated with the ongoing agricultural use of the site.

Table 2.3 Candidate Threatened Flora Species Targeted and Field Survey Methods Used

Survey Group	Target Species	Species Survey Period	Survey Dates	Survey Method	Areas Surveyed by PCT Association and/or Habitat Suitability	
					483	1661
Group 1	<i>Diuris tricolor*</i>	September–October	13–14 October 2021	10 m parallel traverse	-	x Surveyed within areas of lower disturbance including the Scattered Trees and parts of the Moderate to Low Derived Native Grassland condition zones)
Group 2	<i>Ozothamnus tessellatus *</i>	September–October	13–14 October 2021	20 m parallel traverse	-	x (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)
	<i>Monotaxis macrophylla</i>	August–February	13–14 October 2021	20 m parallel traverse	-	x (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)
Group 3	<i>Homoranthus darwinioides*</i>	March–December	23 November 2021	10 m parallel traverse	-	x (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)
	<i>Pomaderris queenslandica</i>	All year	23 November 2021	10 m parallel traverse	-	x (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)

Survey Group	Target Species	Species Survey Period	Survey Dates	Survey Method	Areas Surveyed by PCT Association and/or Habitat Suitability	
					483	1661
Group 4	<i>Cymbidium canaliculatum</i> *	All year	31 January 2022 2 February 2022	20 m parallel traverse	-	x (Scattered trees condition zone)
Group 5	<i>Cymbidium canaliculatum</i> *	All year	7–10 February 2022	Phase 1 grid-based search	x (Scattered trees condition zone)	-
	<i>Monotaxis macrophylla</i>	August–February	7–10 February 2022	Phase 1 grid-based search	x Precautionary survey only, Development Footprint assessed as too disturbed to support this species. (Moderate and Moderate to Low Derived Native Grassland Condition Zones and Scattered Trees Condition Zone where surrounded by the above zones)	x (Low Condition Derived Native Grassland)
Group 6	<i>Monotaxis macrophylla</i>	August–February	31 January 2022 2, 7–8 February 2022	20 m parallel traverse	-	x Precautionary survey only, Development Footprint assessed as too disturbed to support this species. (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)

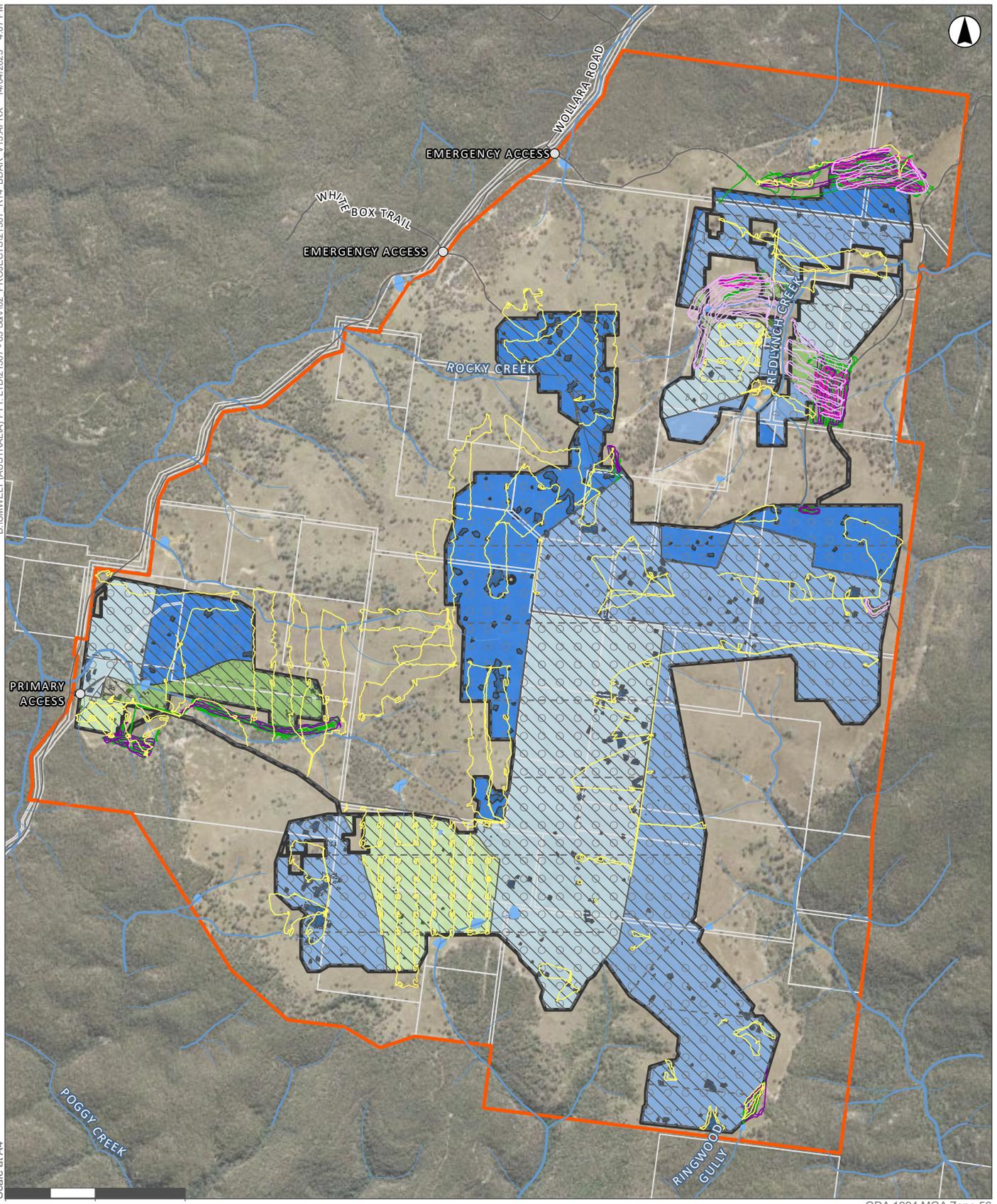
Survey Group	Target Species	Species Survey Period	Survey Dates	Survey Method	Areas Surveyed by PCT Association and/or Habitat Suitability	
					483	1661
	<i>Commersonia rosea</i> *	All year	31 January 2022 2, 7–8 February 2022	10 m parallel traverse	-	x (Scattered trees and Moderate to Low Derived Native Grassland conditions zones where shrubs were present)
	<i>Cymbidium canaliculatum</i> *	All year	31 January 2022 2, 7–8 February 2022	10 m parallel traverse	-	x (Scattered Trees Condition Zone)

KEY TO SYMBOLS

x = Survey completed in PCT

Blank cells = Non-associated PCT / targeted survey for species not completed in PCT as no suitable habitat present

* = Species not associated with PCTs in BAM-C



GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Waterbodies
 - Property Boundaries
 - Phase 1 Grid Search Circles
 - Development Footprint
 - Project Area

Threatened Flora Survey Transects

- Group 1 and 2
- Group 3
- Group 4
- Group 5
- Group 6

Draft Native Vegetation Regulatory Map

- Category 1 - exempt land

Plant Community Types and Condition Zones

PCT 483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

- Low Condition Derived Native Grassland

- Moderate to Low Condition Derived Native Grassland
 - Moderate Condition Derived Native Grassland
 - Scattered Trees
- PCT 1661 - Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin**
- Low Condition Derived Native Grassland
 - Moderate to Low Condition Derived Native Grassland
 - Scattered Trees

FIGURE 2.2

Field Survey Locations - Threatened Flora Surveys

2.4 Threatened Fauna Survey Methods

2.4.1 Review of Existing Information

The following existing information was reviewed to inform the threatened fauna species surveys and assessment of habitat constraints and microhabitats:

- BAM-C (available online to accredited BAM assessors).
- Threatened fauna records held on the NSW BioNet Atlas of NSW Wildlife within the Assessment Area (NSW DPE 2023a).
- Vegetation associations reports for the Sydney Basin IBRA bioregion – Kerrabee IBRA sub-region for each PCT present to determine threatened fauna species PCT associations.
- Habitat constraints listed in the TBDC (DPE 2023c).

2.4.2 BioNet Atlas Threatened Fauna Records

Details of the threatened fauna species recorded on the BioNet Atlas within 5 km of the subject land are summarised in **Table 2.4**. Fauna species with a moderate or high potential to occur have been included for further assessment as either ecosystem credit, species credit or dual credit entities.

Table 2.4 BioNet Atlas Threatened Fauna Records within 10 km

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded	Number of Records	Likelihood of Occurrence
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered	Critically Endangered	5/11/2019	73	Foraging habitat use: high, Breeding habitat use: low
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	Vulnerable	Vulnerable	11/12/2000	1	Low to moderate
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Vulnerable	-	4/08/2021	94	Observed
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable	Endangered	3/09/2011	7	Moderate
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Vulnerable	Vulnerable	21/10/2020	69	Observed
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable	Vulnerable	7/4/2022	35	High
<i>Chthonicola sagittata</i>	Speckled Warbler	Vulnerable	-	24/02/2022	198	High
<i>Circus assimilis</i>	Spotted Harrier	Vulnerable	-	23/05/2019	4	High
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Vulnerable	-	15/03/2022	295	High
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	-	21/10/2020	57	High
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Vulnerable	Endangered	1/07/2004	1	Low, single record south of Goulburn River
<i>Falco subniger</i>	Black Falcon	Vulnerable	-	8/01/2019	2	Moderate
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Vulnerable	-	11/12/2000	1	Low
<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable	-	15/03/2022	142	Observed
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Vulnerable	22/10/2019	14	High
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Vulnerable	-	22/09/2015	4	Not likely to occur
<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable	-	2/10/2020	10	Moderate
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	Vulnerable	19/02/2021	9	Observed

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded	Number of Records	Likelihood of Occurrence
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Critically Endangered	14/05/2005	2	Low to moderate potential of occasional occurrence
<i>Leipoa ocellata</i>	Malleefowl	Endangered	Vulnerable	19/12/1989	2	Low
<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable	-	4/10/2008	3	Moderate
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Vulnerable	-	3/11/2020	52	High
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	-	1/10/2019	53	High
<i>Miniopterus australis</i>	Little Bent-winged Bat	Vulnerable	-	4/03/2010	2	High
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Vulnerable	-	7/04/2022	46	High
<i>Neophema pulchella</i>	Turquoise Parrot	Vulnerable	-	2/10/2020	58	High
<i>Ninox connivens</i>	Barking Owl	Vulnerable	-	3/11/2020	18	Observed
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	-	11/06/2016	10	Moderate
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	Vulnerable	Vulnerable	25/02/2010	3	Low
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Endangered	Vulnerable	19/05/2010	3	Low
<i>Petroica boodang</i>	Scarlet Robin	Vulnerable	-	29/06/2018	12	High
<i>Petroica phoenicea</i>	Flame Robin	Vulnerable	-	26/02/2010	1	High
<i>Phascolarctos cinereus</i>	Koala	Endangered	Endangered	2/10/2016	7	Low (record marked on site from 1957 with questionable locational accuracy). Recent call, scat and scratching records are 5 km SW on alluvial flats associated with the Goulburn River.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Date Last Recorded	Number of Records	Likelihood of Occurrence
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Vulnerable	-	22/10/2019	13	High
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Vulnerable	-	3/03/2010	3	Moderate
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	-	4/03/2010	7	Moderate
<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable	-	15/03/2022	123	Observed
<i>Tyto novaehollandiae</i>	Masked Owl	Vulnerable	-	27/09/2020	3	Low
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	Vulnerable	-	28/03/2022	12	High

2.4.3 Habitat Constraints Assessment

Field-based searches were undertaken to assess the habitat constraints for the candidate threatened fauna species. These searches included observation of habitat constraints identified from the desktop review of the TBDC and recording of the presence, quality and/or suitability of micro-habitats present including:

- hollow bearing trees, particularly those of suitable size for threatened cockatoo and owl breeding habitat
- Koalas use trees
- aquatic habitats suitable for amphibians
- rocky habitats suitable for reptiles
- outcrops, caves, tunnels and old buildings suitable for threatened microbat species.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the confirmed candidate threatened species assessment in the BAM-C. Where species presence could not be ruled out in accordance with Section 5.2 of the BAM, surveys were conducted.

2.4.4 Fauna Surveys

2.4.4.1 Fauna Survey Guidelines

Targeted surveys for candidate threatened fauna species were completed with reference to the following:

- NSW BioNet Atlas incorporating the Threatened Biodiversity Data Collection (NSW DPE 2022a).
- NSW Survey Guide for Threatened Frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE 2020e).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, NSW Department of Environment and Conservation (NSW DEC 2004).
- 'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method, Office of Environment and Heritage (NSW OEH 2018b).
- Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010a).
- Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DSEWPC 2011).
- Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010b).

- Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010c).
- Camera Trapping: wildlife management and research (Meek and Fleming 2014).

2.4.4.2 Diurnal Fauna Surveys

The following methods were utilised for targeted diurnal fauna surveys:

- Nest site searches for candidate raptor species.
- Searches for threatened cockatoo feeding and breeding trees.
- Searches and assessment of potential threatened owl nest trees.
- Searches for microbat roosts and ultrasonic call recording.
- Amphibian habitat searches and call playback.
- Opportunistic observation.
- The details of diurnal fauna surveys completed are provided in **Table 2.5** and fauna survey locations are mapped in **Figure 2.3**.

Table 2.5 Details of Diurnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
09/08/21	<ul style="list-style-type: none"> • Targeted diurnal census. • Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	5–18°C, light ESE breeze, no rain.	6.25 hrs x 2 persons / 1015–1630
10/08/21	<ul style="list-style-type: none"> • Targeted diurnal census. • Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	2–21°C, light WNW breeze, no rain.	9.5 hrs x 2 people / 0730–1700
11/08/21	<ul style="list-style-type: none"> • Targeted diurnal census. • Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	3–23°C, light WNW breeze, no rain.	9.25 hrs x 2 people / 0730–1645

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
12/08/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	12–20°C, light WNW breeze, no rain.	6.75 hrs x 2 people / 0745–1430
23/08/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna, breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	7–21°C, light NNW breeze, no rain.	4.5 hrs x 2 people / 1300–1730
24/08/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	7–10°C, light WNW wind 11.6 mm rain.	4.5 hrs x 2 people / 1200–1630
25/08/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	3–15°C, WNW wind, 4.4 mm rain in the morning.	5 hrs x 2 people / 1230–1730
26/08/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Barking Owl Powerful Owl Masked Owl	1–18°C, WSW breeze, no rain.	4 hrs x 2 people / 1030–1430
21/09/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Square-tailed Kite Barking Owl	15°C, WSW breeze, no rain.	7.5 hrs x 2 people / 1000–1730
22/09/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Glossy Black-Cockatoo Little Eagle Square-tailed Kite Barking Owl	10–20°C, NW breeze, no rain.	7.5 hrs x 2 people / 0700–1430
13/10/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Gang-gang Cockatoo Little Eagle Square-tailed Kite Barking Owl	10–20°C, ESE breeze, no rain.	10 hrs x 2 people / 1000–2000

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
14/10/21	<ul style="list-style-type: none"> Targeted diurnal census. Avifauna breeding activity, stick nest and tree hollow search. 	Gang-gang Cockatoo Little Eagle Square-tailed Kite Barking Owl	15–20°C, SSE breeze, no rain.	3.5 hrs x 2 people / 0800–1130
23/11/21	<ul style="list-style-type: none"> Reptile rock-rolling searches. Opportunistic observation of avifauna breeding activity. 	Pink-tailed Legless Lizard Striped Legless Lizard Gang-gang Cockatoo Square-tailed Kite Barking Owl	14–25°C, ESE breeze, no rain.	6 x rock rolling searches of ≈ 200 rocks per search 10.5 hrs x 2 people / 0830–1900
24/11/21	<ul style="list-style-type: none"> Reptile rock-rolling searches. Avifauna breeding activity, stick nest and tree hollow search. 	Pink-tailed Legless Lizard Striped Legless Lizard Gang-gang Cockatoo Square-tailed Kite Barking Owl	16–26°C, WNW breeze, 1 mm rain.	2 x rock rolling searches of ≈ 200 rocks per search 8.75 hrs x 2 people / 0745–1630
7/12/21	<ul style="list-style-type: none"> Avifauna breeding activity, stick nest and tree hollow search. 	Gang-gang Cockatoo Square-tailed Kite Barking Owl	15–26°C, WNW breeze, 2.8 mm rain with evening thunderstorms	3 hrs x 2 people / 1700–2000
8/12/21	<ul style="list-style-type: none"> Avifauna breeding activity, stick nest and tree hollow search. 	Gang-gang Cockatoo Square-tailed Kite Barking Owl	14–28°C, SSW moderate to strong wind, 12.2 mm rain with intermittent thunderstorm.	7 hrs x 2 people / 1300–2000
9/12/21	<ul style="list-style-type: none"> Avifauna breeding activity, stick nest and tree hollow search. 	Gang-gang Cockatoo Square-tailed Kite Barking Owl	12–25°C, WNW breeze, 58 mm rain (fine during survey but heavy rainfall night prior).	3.5 hrs x 2 people / 0900–1230
31/01/22	Opportunistic observation.	All threatened fauna species	15–33°C, SSE breeze, no rain.	2.25 hrs x 2 people / 1445–1700
1/02/22	Opportunistic observation.	All threatened fauna species	16–32°CW breeze, no rain.	10.5 hrs x 2 people / 0730–1800
2/02/22	Opportunistic observation.	All threatened fauna species	20–25°C, SE breeze, overcast with 0.4 mm rain.	6.5 hrs x 2 people / 0730–1400
3/02/22	BAM plots / Opportunistic observation.	All threatened fauna species	16–23°C, light ESE breeze, 2.4 mm rain.	9.5 hrs x 2 people / 0800–1730

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
7/02/22	Opportunistic observation.	All threatened fauna species	12–15°C, E breeze, 0.2 mm rain with late afternoon thunderstorm.	9 hrs x 2 people / 1000–1900
8/02/22	Opportunistic observation.	All threatened fauna species	10–26°C, ESE breeze, 0.2 mm rain.	11 hrs x 2 people / 0700–1800
9/02/22	Opportunistic observation.	All threatened fauna species	7–30°C, SSW breeze, no rain.	11 hrs x 2 people / 0700–1800
10/02/22	Opportunistic observation.	All threatened fauna species	10–34°C, light S breeze, no rain.	9.5 hrs x 2 people / 0700–1630
10/03/22	Opportunistic observation.	All threatened fauna species	13–22°C, E breeze, no rain.	12 hrs x 2 people / 0630–1830
21/03/22	BAM plots / Opportunistic observation.	All threatened fauna species	12–26°C, E breeze, no rain.	1.5 hrs x 2 people / 1530–1700
22/03/22	BAM plots / Opportunistic observation.	All threatened fauna species	10–30°C, WNW wind, no rain.	9 hrs x 2 people / 0730–1630
23/03/22	BAM plots / Opportunistic observation.	All threatened fauna species	13–30°C, ESE breeze, no rain.	9 hrs x 2 people / 0730–1630
24/03/22	BAM plots / Opportunistic observation.	All threatened fauna species	17–22°C, ESE breeze, no rain.	9 hrs x 2 people / 0730–1630
25/03/22	BAM plots / Opportunistic observation.	All threatened fauna species	15–23°C, ESE breeze, no rain.	2.5 hrs x 2 people / 0730–1000
5/04/22	BAM plots / Opportunistic observation.	All threatened fauna species	15–21°C, ESE breeze, no rain.	9.25 hrs x 2 people / 0730–1645
6/04/22	BAM plots / Opportunistic observation.	All threatened fauna species	11–21°C, SE breeze, overcast, no rain.	10 hrs x 2 people / 0730–1730
7/04/22	BAM plots / Opportunistic observation.	All threatened fauna species	17–20°C, SE breeze, no rain.	9.5 hrs x 2 people / 0730–1700
7/04/22	Threatened amphibian aural-visual search transects and call playback survey.	Red-crowned Toadlet	17–20°C, SE breeze, light drizzle.	2 x transects of ≈500 m completed by 2 people / 1800–2000
15/06/22	Avifauna breeding activity and hollow search.	Powerful Owl Masked Owl Barking Owl	17°C, WNW breeze, no rain.	5 hrs x 2 people / 1200–1700
16/06/22	Avifauna breeding activity and hollow search.	Powerful Owl Masked Owl Barking Owl	5–19°C, NW breeze, no rain.	5 hrs x 2 people / 0745–1245

2.4.4.3 Nocturnal Fauna Surveys

The following methods were utilised for targeted nocturnal fauna surveys:

- spotlighting and stag-watching searches
- amphibian habitat searches
- quiet listening for candidate threatened fauna calls
- targeted call playback.

Details of these surveys are provided in **Table 2.6**.

Table 2.6 Details of Nocturnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
23/08/21	Quiet listening Call playback x2 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl Masked Owl Powerful Owl	10°C, light E wind, no rain.	2.75 hrs x 2 people 1730–2015
25/08/21	Quiet listening Call playback x3 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl Masked Owl Powerful Owl	15-5°C, WNW wind, no rain during surveys.	4.25 hrs x 2 people 1730–2145
30/08/21	Quiet listening Call playback x3 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl Masked Owl Powerful Owl	10-5°C, fine, no wind, recent rain	4.5 hrs x 2 people 1700–2130
13/10/21	Quiet listening Stag Watching Call playback x1 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl	10°C, fine, ESE breeze, no rain.	1 hr x 2 people 1900–2000
23/11/21	Quiet listening Stag Watching Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl	16°C, overcast, ESE breeze, no rain (prior rain on 20-22/11/21)	1.5 hrs x 2 people 2000–2130

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
7/12/21	Quiet listening Stag Watching Call playback x4 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl	15°C, overcast, WNW wind, high humidity with thunderstorm during evening	3 hrs x 2 people 2000–2300
8/12/21	Quiet listening Stag Watching Call playback x4 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl	15°C, SSW winds, intermittent thunderstorms	1.5 hrs x 2 people 2000–2130
2/02/22	Spotlighting and general amphibian survey	Opportunistic spotlighting	18°C, overcast, SE breeze, no rain (prior rain on 26-28/01/22).	1 x ≈500 m transect completed by 2 people over 1.5 hrs 2000–2130
6/04/22	Spotlighting and general amphibian survey	Opportunistic spotlighting	20°C, overcast, SE breeze, no rain (prior rain on 2/04/22).	1 x ≈500 m transect completed by 2 people over 2 hrs 1800–2000
15/06/22	Quiet listening Stag Watching Call playback x 4 Spotlighting	Koala Greater Glider Squirrel Glider Barking Owl Masked Owl Powerful Owl	10-5°C, fine, WNW breeze, no rain.	5 hrs x 2 people 1630–2130

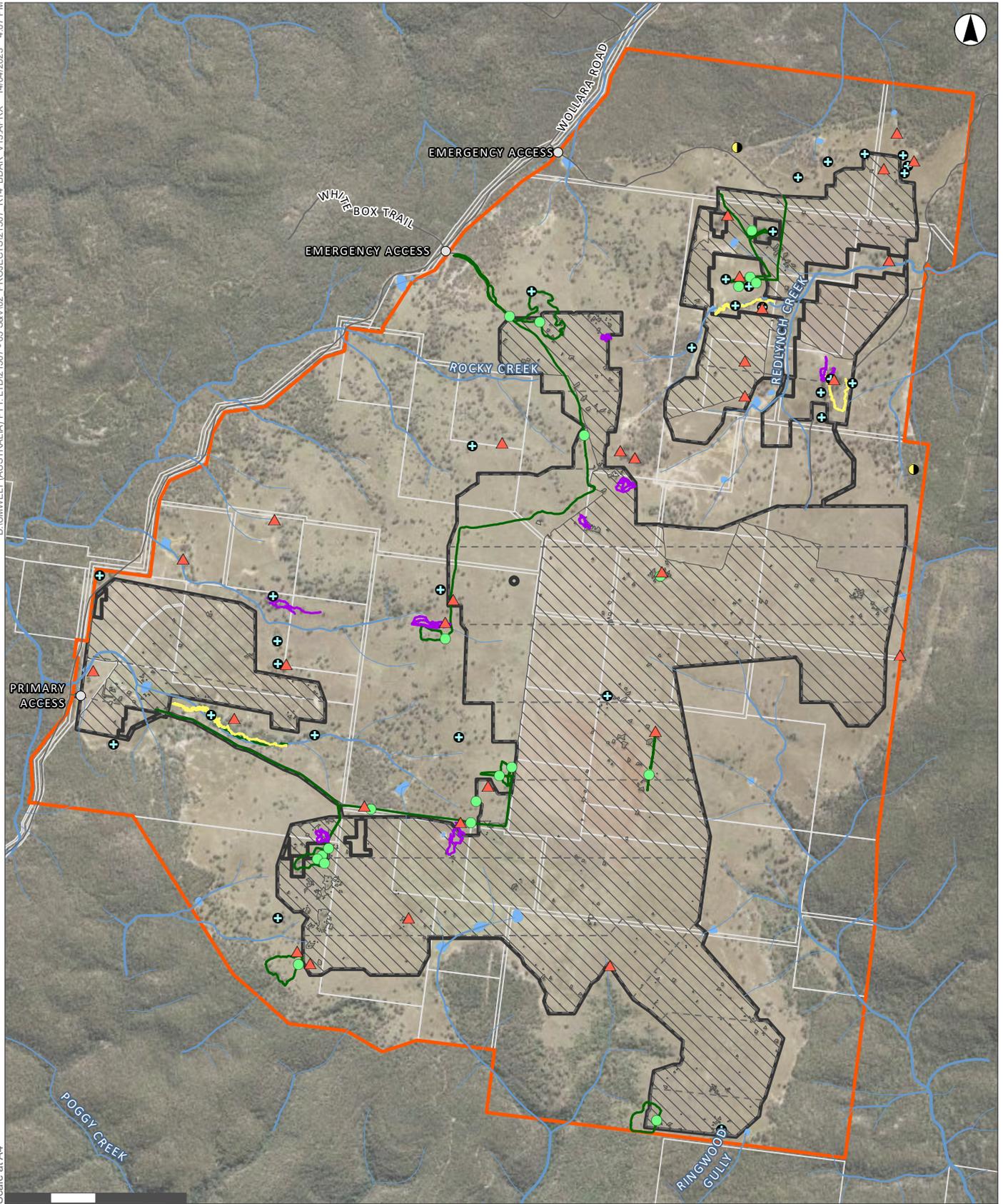
2.4.4.4 Remote Detection Fauna Surveys

The following methods were utilised for the completion of targeted fauna remote detection surveys:

- Arboreal baited remote camera surveys
- Ultrasonic microbat call recording.
- Details of these surveys are provided in **Table 2.7**.

Table 2.7 Details of Remote Detection Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Weather conditions	Survey Effort / Time
1/02/2022–10/03/2022 (rebaited 9/02/2022)	Arboreal baited remote triggered camera survey	All threatened mammals (Koala, Greater Glider, Squirrel Glider)	variable	1080 camera trap nights (30 cameras x 36 nights)
13/12/2021 - 26/12/2022	Ultrasonic microbat call detection (Anabat)	Large-eared Pied-bat Eastern Cave Bat	Variable (Min temp = 9.1°C, 4 nights with rainfall >0.2 m)	18 recording nights with 2 Anabats (1 unit x 4 nights, 1 unit x 14 nights)



GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Waterbodies
 - Property Boundaries
 - Development Footprint
 - Project Area
 - Draft Native Vegetation Regulatory Map
 - Category 1 - exempt land

- Threatened Fauna Surveys**
- ▲ Diurnal Bird Survey Locations (30)
 - Call Playback Locations (21)
 - Anabat Locations (2)
 - Camera Locations (30)
 - Reptile Rock Roll Searches
 - Nocturnal Spotlight Survey
 - Transects
 - Amphibian Survey Transects

FIGURE 2.3

Field Survey Locations - Threatened Fauna Surveys

2.5 Threatened Fungi

No threatened fungi species were identified as predicted or candidate threatened species.

2.6 Weather Conditions

All flora surveys were completed during suitable weather conditions. The weather conditions during fauna surveys are listed in **Table 2.5**, **Table 2.6** and **Table 2.7**.

2.7 Limitations

The surveys completed were undertaken during the appropriate seasons specified within the TBDC to maximise the probability of detection. Some candidate threatened flora species which require fire for germination were surveyed as a precaution and it is considered that grazing and clearing have resulted in the disruption of natural fire regimes and the site is too disturbed to support these species.

BAM Plot surveys were also completed mostly during warmer months to ensure that both perennial and annual species were sampled within grassland plots.

All surveys for candidate threatened flora species consisted of multi-species searches in groups according to detection period and stratum as indicated in **Table 2.3**. These surveys were limited to a maximum of five species per group and the same stratum to overcome limitations associated with species detection.

The surveys for Koalas for this assessment were completed prior to the release of the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide on 17 June 2022 (NSW DPE 2022b). The BCD BOS Help Desk Team were consulted in June 2022 via email regarding the new survey guidelines and advised that:

If the Department publishes new or amend existing survey guides to support the application of the BAM, assessors are expected to apply these to all assessments for which the survey component has yet to be completed, and to all new assessments that commence on, or after the publication date. This is to ensure that your biodiversity assessment reports (BAR) meet the requirements of BAM s6.5.1.3. (BAM 2020 5.3(2.b.).

Where survey has been completed prior to the publication of a survey guide, the Department expects the assessor (or surveyor) to have applied current best-practice in searching for the target species (in accordance with BAM s6.5.1.4). Assessors can use information from other published, peer-reviewed sources to guide survey technique and effort, but this must be clearly documented and justified in the BAR as well as indicating how this differs from our recently published guide.

Koala surveys for this Project were undertaken in accordance with the best practice methods at the time the surveys were completed. The methods utilised for the detection of Koalas for this assessment consisted of spotlighting (8 nights) and remote baited arboreal camera surveys (1080 camera trap nights). Survey methods within the new guidelines (NSW DPE 2022b) which were not utilised included scat search surveys, use of Koala detection dogs, call recording and thermal drone surveys.

3.0 Site Context

3.1 Assessment Area

The Assessment Area, which includes the Development Footprint and the area of land within a 1500 m buffer zone is shown on the Location Map in **Figure 1.2**.

3.2 Landscape Features

Landscape features identified within the Development Footprint are shown on the Site Map provided as **Figure 1.1** and landscape features in the Assessment Area are shown on the Location Map provided as **Figure 1.2**. Further information on landscape features is provided in **Sections 3.2.1** to **Sections 3.2.7**.

3.2.1 IBRA Bioregions and IBRA Subregions

The Development Footprint is located within the Sydney Basin IBRA bioregion and Kerribee IBRA subregion.

3.2.2 Rivers, Streams, Estuaries and Wetlands

The locations of the streams within the Development Footprint are shown on the Site Map provided as **Figure 1.1** and the locations of streams and rivers within the Assessment Area are shown on the Location Map provided as **Figure 1.2**.

There are several first and second order streams within the Development Footprint. One third order watercourse associated with Redlynch Creek did fall within one iteration of the Development Footprint but has subsequently been excluded. All watercourses within or immediately outside the Development Footprint flow into the Goulburn River. There are no estuaries or wetlands located within or adjacent to the Development Footprint or the Project Area. The Project Area is within the Goulburn River Catchment which joins the Hunter River near Denman. The Ramsar listed Hunter Estuary Wetlands – Kooragang Nature Reserve is approximately 160 km downstream of the Project Area as shown in **Figure 3.1**.

3.2.3 Habitat Connectivity

The Development Footprint contains agricultural land, predominantly comprised of grazed grasslands with remnant trees. It is surrounded by the Goulburn River National Park. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats.

The Development Footprint contains three polygons which are separated by proposed vehicle access tracks, as shown in **Figure 3.2**. The three polygons which form the Development Footprint will be protected with fauna exclusion fencing, however the vehicle tracks will not be fenced to prevent habitat fragmentation and ensure that access for terrestrial fauna species is maintained through the Project Area.

The Goulburn River National Park contains an expanse of native vegetation and connects regionally to several other large natural areas managed for conservation along the Great Dividing Range, including Wollemi and Yengo National Parks to the south, Goonoo State Conservation Area to the west and Coolah Tops National Park to the north.

3.2.4 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

No karst, caves, crevices, cliffs, rocks or other geological features of significance were observed within the Development Footprint. Review of aerial imagery has identified the presence of rock areas and small cliffs outside of the Development Footprint, within the Assessment Area. These rocky habitats are mapped in **Figure 3.2**.

3.2.5 Areas of Outstanding Biodiversity Value

The Development Footprint and Assessment Area do not contain any Areas of Outstanding Biodiversity Value (AOBV) (formerly critical habitat), as identified under the BC Act.

3.2.6 NSW (Mitchell) Landscapes

The Development Footprint is mapped as occurring within the Liverpool Range Valleys and Foothills NSW (Mitchell) Landscape.

3.2.7 Additional Landscape Features Identified in the SEARS

There are no specific additional landscape features identified for assessment in the SEARS.

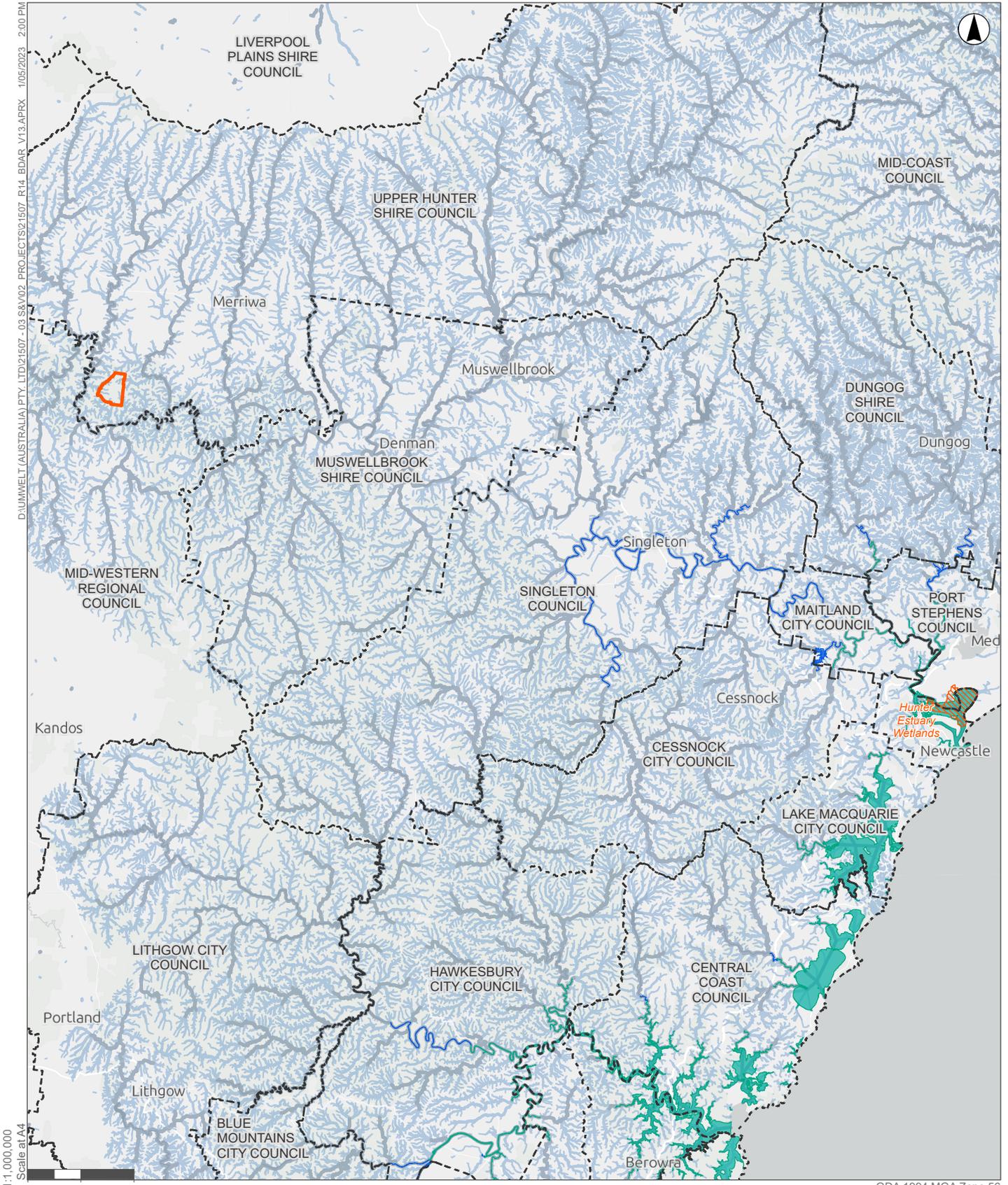
3.3 Native Vegetation Cover

The native vegetation cover within the Assessment Area was determined through site surveys of the Development Footprint and aerial photograph interpretation using ArcMap software and the world imagery base map aerial dated 9 August 2018.

Table 3.1 summarises the extent of native vegetation cover within the assessment area and **Figure 1.2** shows the extent of native vegetation cover within the assessment area.

Table 3.1 Native Vegetation Cover in the Assessment Circle

Native Vegetation Cover	
1500 m Buffer Assessment Area (ha)	4586.84 ha
Total Area of Native Vegetation Cover (ha)	4569.17 ha
Percentage of Native Vegetation Cover (%)	99.61%
Class (0–10, >10–30, >30–70 or >70%)	>70%



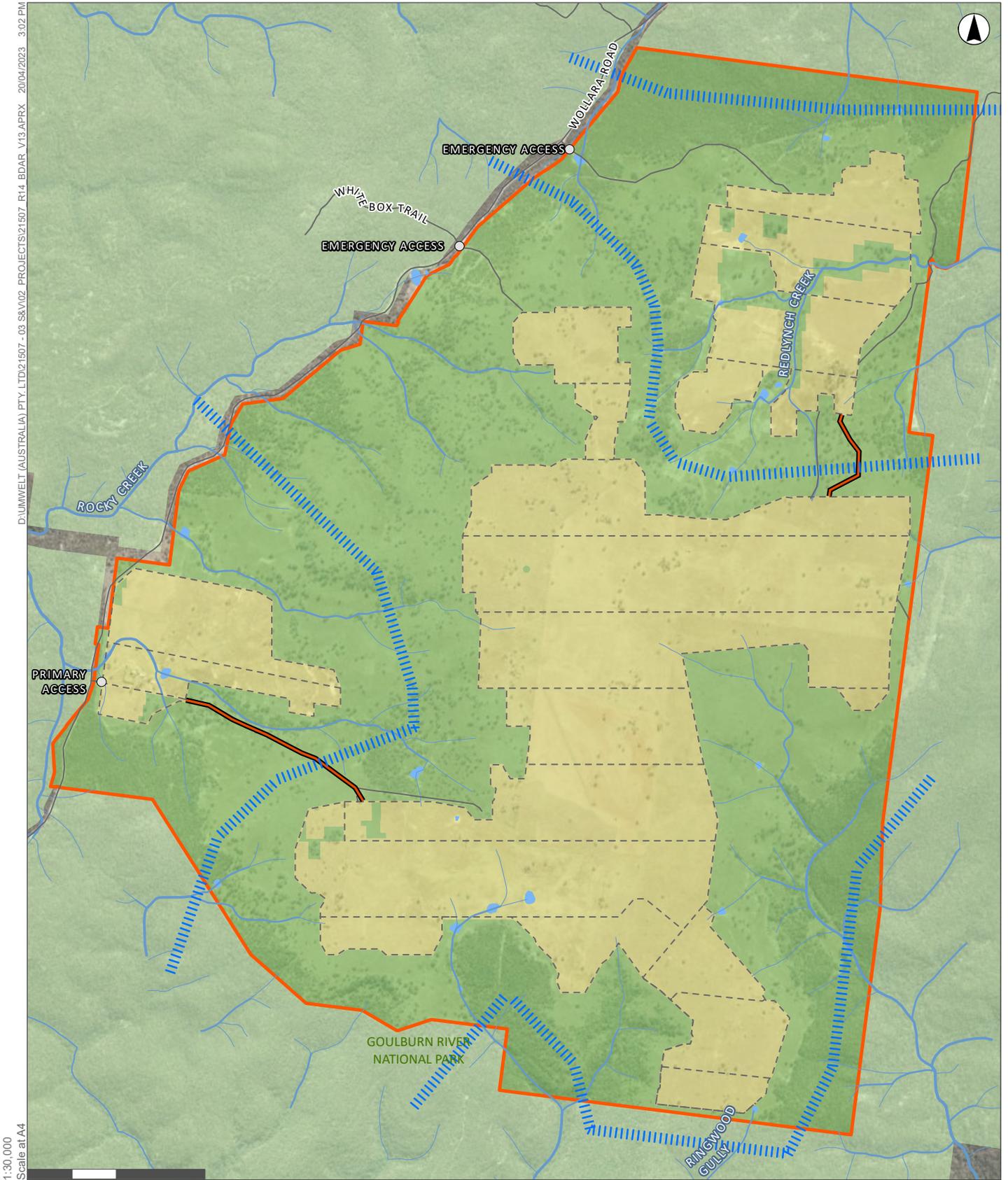
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GDA 1994 MGA Zone 56

FIGURE 3.1

Rivers, Streams, Estuaries and Wetlands Downstream of the Subject Land



- Legend**
- Access Points
 - - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Unfenced Vehicle Access Track
 - ▨ Retained Connectivity Pathway
 - ▭ Project Area
 - ▭ Development Footprint
 - ▭ NSW National Parks
 - ▭ Retained Habitat Areas
 - ▭ Waterbodies

FIGURE 3.2

Habitat Connectivity

4.0 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

4.1 Native Vegetation Extent

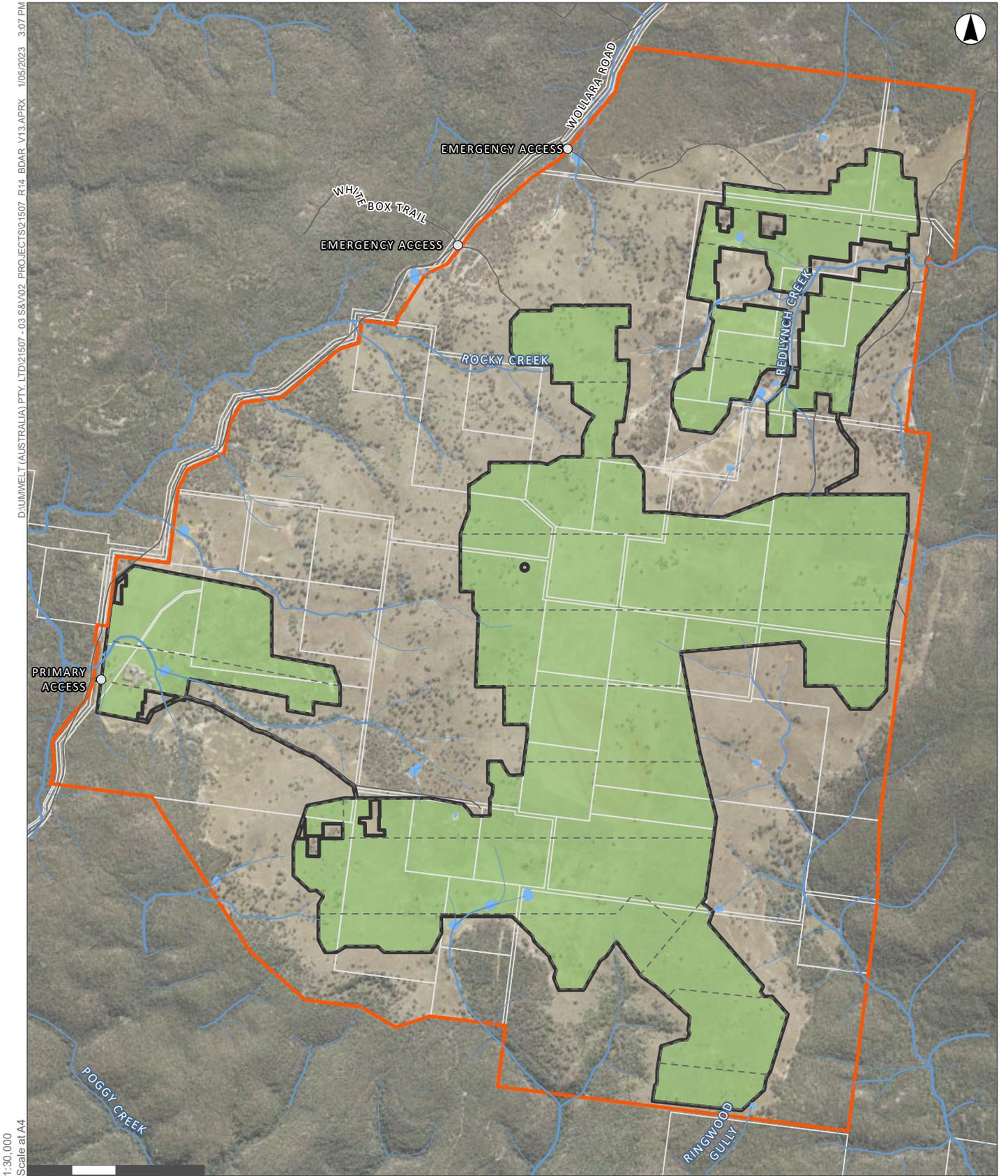
The parts of the Development Footprint assessed as native vegetation for the purposes of the vegetation integrity surveys are shown in **Figure 4.1**.

4.1.1 Changes to the Mapped Native Vegetation Extent

No notable changes were observed during surveys to the mapped native vegetation extent visible on the aerial imagery utilised for this assessment.

4.1.2 Areas That Are Not Native Vegetation

There are minor areas assessed as not native vegetation, these are situated around the existing dwelling where exotic vegetation has been established and in areas that are totally cleared including several small existing dams.



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GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - - Proposed Access Tracks
 - Existing Roads and Tracks
 - - - Property Boundaries
 - ▬ Development Footprint
 - ▬ Project Area
 - Native Vegetation

FIGURE 4.1
Development Footprint Native
Vegetation Extents

4.2 Plant Community Types

4.2.1 Overview of PCTs Present

The PCTs identified in this assessment are based on the PCTs available prior to the release of the revised PCTs for eastern NSW and associated update to the BAM-C which occurred in February 2023. In-progress BAM-C assessments and projects with substantially progressed surveys are able to undertake this approach, in accordance with the transitional arrangements.

Vegetation within the Development Footprint has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within **Table 4.1** and their extent is shown in **Figure 4.2**. Detailed descriptions of each PCT are provided in **Section 4.2.2**.

Surveys were also completed within the following PCTs which were originally part of the Development Footprint but later excluded as part of the impact avoidance measures achieved for the Project:

- PCT 1607 Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter (0.64 ha survey area).
- PCT 1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin (0.83 ha survey area).

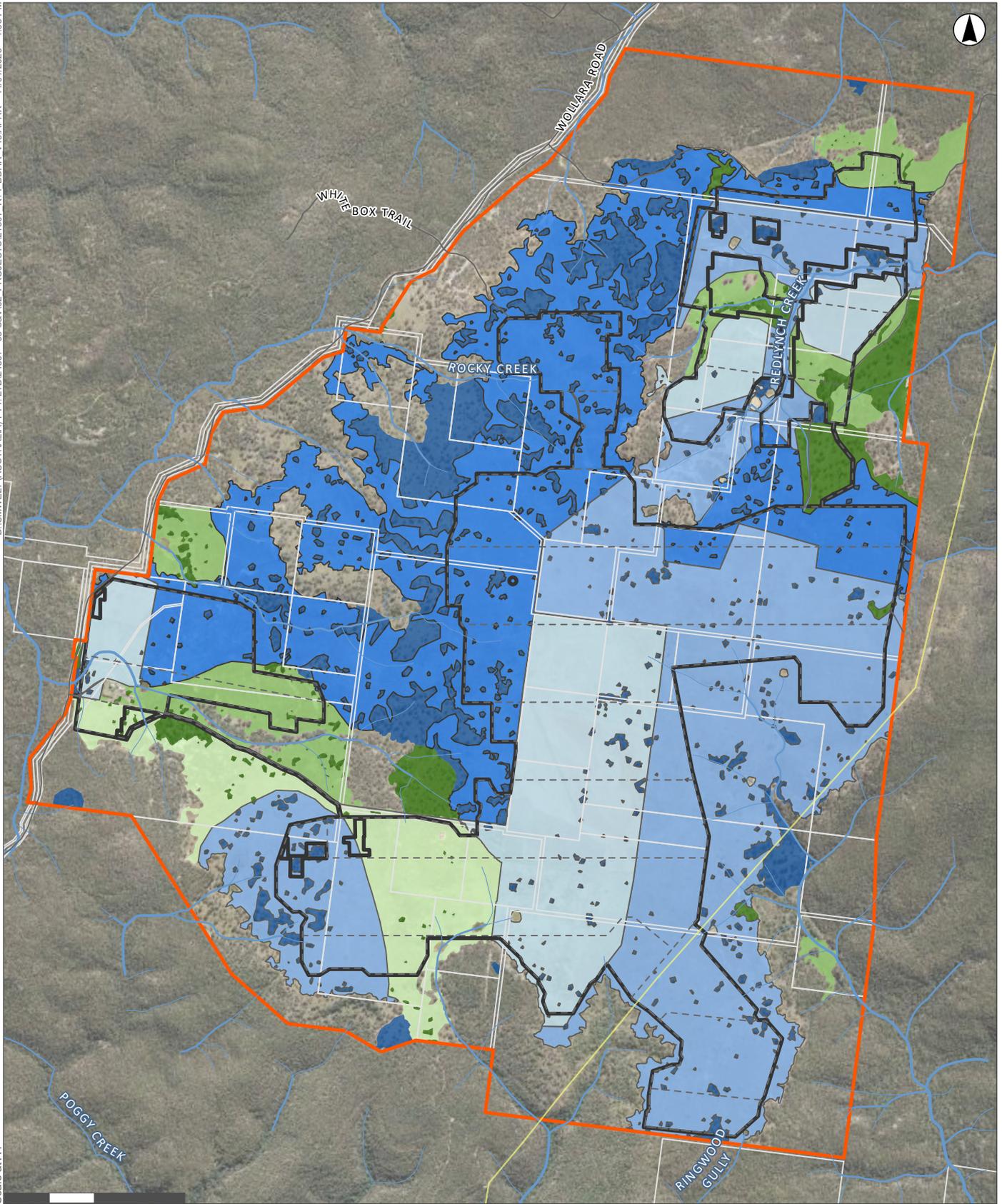
Table 4.1 Plant Community Types Identified within the Development Footprint

PCT ID	PCT name	Vegetation Class	Vegetation Formation	NSW VIS Percentage Cleared Estimate	Development Footprint Vegetation Condition Zone	Plots Completed	Condition Zone Area (ha)	Total PCT Area (ha)
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Western Slopes Grassy Woodlands	Grassy Woodlands	90%	Scattered Trees	5	23.64	699.63
					Moderate Condition Derived Native Grassland	18	168.48	
					Moderate to Low Condition Derived Native Grassland	19	308.37	
					Low Condition Derived Native Grassland	10	199.14	
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	50%	Scattered Trees	4	6.07	96.10
					Moderate to Low Condition Derived Native Grassland	11	36.79	
					Low Condition Derived Native Grassland	5	53.24	
N/A	Waterbodies / Dams	N/A	N/A	N/A	N/A	N/A	1.60	1.60
N/A	Cleared Land	N/A	N/A	N/A	N/A	N/A	2.18	2.18



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Scale at A4



Legend

- Electricity Transmission Line
- Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Property Boundaries
- Development Footprint
- Project Area

Plant Community Types and Condition Zones

- PCT 483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley
- Low Condition Derived Native Grassland

- Moderate to Low Condition Derived Native Grassland
- Moderate Condition Derived Native Grassland
- Scattered Trees

PCT 1661 - Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

- Low Condition Derived Native Grassland
- Moderate to Low Condition Derived Native Grassland
- Scattered Trees

FIGURE 4.2

Plant Community Types and Vegetation Condition Zones

4.2.2 Description of PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

4.2.2.1 PCT Description

PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley is the dominant PCT across the Development Footprint, its characteristics are summarised in **Table 4.2**. DPE (2022) have identified this PCT occurs as a mid-high to tall open woodland or woodland dominated by a White Box (*Eucalyptus albens*) x Grey Box (*Eucalyptus moluccana*) intergrade on brown to black earth, chocolate loam to clay soils derived from basalt on the Merriwa Plain and lower southern slopes of the Liverpool Range. This PCT is associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act and the EBPC Act.

Table 4.2 Overview of PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley Characteristics

PCTID	483
PCT name	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodland
Percent cleared value (%)	90%
Condition States and Extent within Development Footprint (ha)	Condition Zone 1 – Scattered Trees: 23.64 ha Condition Zone 2 – Moderate Condition Derived Native Grassland: 168.48 ha Condition Zone 3 – Moderate to Low Condition Derived Native Grassland: 308.37 ha Condition Zone 4 – Low Condition Derived Native Grassland: 199.14 ha Total Area: 669.63 ha
Location	The Development Footprint is centred on a fertile Basalt Cap. This PCT is associated with the Basalt Cap and the adjoining side slopes and flats. Within the Development Footprint it is replaced by PCT 1661 in areas of higher sandstone influence.
Floristic Description – Canopy Stratum	Where a canopy stratum is present the dominant tree species are <i>Eucalyptus moluccana</i> , <i>Eucalyptus albens</i> and the hybrid <i>Eucalyptus albens</i> x <i>moluccana</i> , which is referred to by some authors as <i>Eucalyptus albemol</i> (McRae and Cooper 1985).
Floristic Description – Mid Stratum	The mid stratum is typically absent due to historical clearing and ongoing pasture improvement and cattle grazing.
Floristic Description – Ground Stratum	The understorey is dominated by grasses including <i>Sporobolus creber</i> , <i>Bothriochloa macra</i> , <i>Austrostipa bigeniculata</i> , <i>Austrostipa scabra</i> , <i>Digitaria brownii</i> , <i>Aristida ramosa</i> , <i>Chloris truncata</i> , <i>Cynodon dactylon</i> with forbs such as <i>Dichondra repens</i> , <i>Calotis lappulacea</i> and <i>Glycine tabacina</i> .

4.2.2.2 Condition States and Alignment with BC Act and EPBC Act Listed TECs

This PCT has been mapped as occurring within the following four condition states within the Development Footprint.

ii. Condition Zone 1 – Scattered Trees

This condition state represents the areas of the Development Footprint which contain a canopy of scattered eucalypts over an understorey composed of derived native grassland.

This condition zone corresponds to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act and the EPBC Act, where surrounded by areas of PCT 483 Condition Zone 2 Moderate Condition Derived Native Grassland and Condition Zone 3 Moderate to Low Condition Derived Native Grassland. This is due to the floristic assessment of these areas as forming patches of >0.1 ha with a predominantly native understorey with 12 or more understorey species present (excluding grasses), including at least one listed important species.

Areas of this condition zone surrounded by areas of Condition Zone 4 Low Condition Derived Native Grassland, correspond to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, but do not correspond to the EPBC listed variant of the CEEC due to these areas containing a predominantly exotic understorey. A photograph of this condition zone is provided as **Photo 4.1**.



Photo 4.1 PCT 483 Condition Zone 1 – Scattered Trees

iii. Condition Zone 2 – PCT 483 Moderate Condition Derived Native Grassland

This condition state represents the best condition derived native grassland areas of this PCT within the Development Footprint. Section 3.3.2 of the BAM Stage 1 Manual (DPIE 2020) identifies that separate vegetation zones are required for parts of the subject land where the vegetation has a current VI Score of <15 for a PCT representative of a CEEC. This approach has been applied for stratifying the areas of derived native grassland for PCT 483 and this condition zone represents the parts of the Development Footprint where the VI score is >15.

These areas typically contain grazing native vegetation and modified pastures with no tree stratum and low shrub cover. This condition zone is characterised by a very low cover of high threat exotics and litter cover was typically present in higher levels than lower quality condition zones.

This condition zone corresponds to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. There is no condition threshold for this CEEC under the BC Act. The condition thresholds for this CEEC under the EPBC Act are met, as this condition zone contains a predominantly native understorey, occurs in patch sizes of > 0.1 ha and more than 12 native understorey species (including one listed important species) are present. A photograph of this condition zone is provided as **Photo 4.2**.



Photo 4.2 PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland

iv. Condition Zone 3 – Moderate to Low Condition Derived Native Grassland

This condition state represents an intermediate condition zone of PCT 483, between areas of moderate and low condition composed of derived native grassland. Section 3.3.2 of the BAM Stage 1 Manual (DPIE 2020) identifies that separate vegetation zones are required for parts of the subject land where they vegetation has a current VI Score of <15 for a PCT representative of a critically endangered ecological community. This approach has been applied for stratifying the areas of derived native grassland for PCT 483 and this condition zone represents the highest of two condition zones for PCT 483 where the VI score is <15.

These areas contained modified pastures with no trees and low shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low cover and species richness of native ferns other native plants. These areas have been degraded by agricultural use and invasion of exotic species. This condition zone typically has poor overall function attributes, with some level of native vegetation resilience still present.

This condition zone also corresponds to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. There is no condition threshold for this CEEC under the BC Act. The condition threshold under the EPBC Act for this CEEC is met, as the understorey is predominantly native, all patches are > 0.1 ha in size and more than 12 native understorey species (including one listed important species) are present. A photograph of this condition zone is provided as **Photo 4.3**.



Photo 4.3 PCT 483 Condition Zone 3 Moderate to Low Condition Derived Native Grassland

v. Condition Zone 4 – PCT 483 Low Condition Derived Native Grassland

This condition state represents the lowest derived native grassland condition state of PCT 483 and is composed of areas of highly degraded agricultural land, which has been cropped or subject to high levels of pasture improvement and now contain a high cover of exotic flora species. There are no native trees, and the understorey typically has a low cover of native species. Section 3.3.2 of the BAM Stage 1 Manual (DPIE 2020) identifies that separate vegetation zones are required for parts of the subject land where they vegetation has a current VI Score of <15 for a PCT representative of a CEEC. This approach has been applied for stratifying the areas of derived native grassland for PCT 483 and this condition zone represents the lowest of two condition zones for PCT 483 where the VI score is <15.

This condition zone contains highly disturbed and typically exotic dominated grassland vegetation, characteristic of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Mostly only low levels of native groundcover species are still present. It is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community independent of their condition be covered by the listing under the BC Act and therefore these areas are considered a highly disturbed example of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC which has no realistic potential for recovery.

The condition threshold under the EPBC Act for this CEEC is however not met, as the patches of this condition zone do not have a predominantly native understorey, as determined by floristic plot surveys. A photograph of this condition zone is provided as **Photo 4.4**.



Photo 4.4 PCT 483 Condition Zone 4 Low Condition Derived Native Grassland

4.2.2.3 Justification for PCT Selection

The NSW VIS identifies that this PCT is characterised as a high to tall open woodland or woodland dominated by a Grey Box (*Eucalyptus moluccana*) x White Box (*Eucalyptus albens*) intergrade forming a *Eucalyptus albens* x *moluccana* intermediate taxon. The trees tend to be closer to Grey Box than White Box over most of this region. Few other tree species occur with Rough-barked Apple (*Angophora floribunda*) and Yellow Box (*Eucalyptus melliodora*) occurring on footslopes and valley flats. Shrubs are absent or very sparse and include *Sclerolaena muricata*, *Sida trichopoda* and *Pimelea curviflora* var. *curviflora*. The ground cover is dense after rain but mid-dense to sparse in dry times. Grass species include *Austrostipa bigeniculata*, *Bothriochloa macra*, *Austrostipa aristiglumis*, *Elymus scaber* var. *scaber*, *Cynodon dactylon* and *Panicum queenslandicum* var. *queenslandicum*. The sedge *Cyperus gracilis* may be present. Forb species include *Boerhavia dominii*, *Oxalis perennans*, *Chamaesyce drummondii*, *Hibiscus trionum*, *Einadia nutans* subsp. *nutans*, *Asperula conferta*, *Rumex brownii*, *Mentha diemenica*, *Geranium solanderi* var. *solanderi* and *Calotis lappulacea*.

This PCT is described in the NSW VIS as occurring on brown to black earth, chocolate loam to clay soils derived from basalt on hillslopes, hillcrests, footslopes and valley flats on rolling hills and low hills on the Merriwa Plain and lower southern slopes of the Liverpool Range in the upper Hunter Valley in the far south-eastern corner of the Brigalow Belt South Bioregion.

The allocation and mapping of this PCT and condition zones was based on the presence of a grassy understorey with a scattered tree canopy dominated by *Eucalyptus moluccana*, *Eucalyptus albens* and the associated intermediate form between the two species. Other flora species identified in the VIS Scientific Description for this PCT which are present include *Pimelea curviflora*, *Austrostipa bigeniculata*, *Bothriochloa macra*, *Boerhavia dominii*, *Oxalis perennans*, *Elymus scaber*, *Anthosachne scabra*, *Cynodon dactylon*, *Chamaesyce drummondii*, *Einadia nutans*, *Austrostipa aristiglumis*, *Asperula conferta*, *Rumex brownii*, *Cyperus gracilis*, *Geranium solanderi*, *Calotis lappulacea* and *Chloris truncata*.

The following other PCTs were considered, but excluded from occurring from areas mapped as this PCT:

- PCT 618 White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley: This PCT was considered but excluded due to lack of diversity in the canopy, particularly the absence of *Eucalyptus blakelyi*, *Angophora floribunda*, *Eucalyptus tereticornis*, *Eucalyptus melliodora* and *Eucalyptus eugenioides*.
- PCT 1304 White Box - Narrow-leaved Ironbark grassy woodland of the Capertee Valley, Sydney Basin Bioregion: This PCT was considered but excluded due to the mismatch of several canopy species and the landscape position of basal Permian sediments of the Capertee Valley Floor.
- PCT 1606 White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter: is described as a forest or woodland with a canopy of *Eucalyptus albens* and *Eucalyptus crebra*. Both of these species are present within this PCT, however PCT 1606 does not include *Eucalyptus moluccana* or *Eucalyptus albemol* which occur within the Development Footprint.
- PCT 1609 White Box - White Cypress Pine - Native Olive woodland of upper Hunter and northern Wollemi: This PCT was considered and excluded due to mismatch in canopy floristics (*Callitris glaucophylla* absent) and understorey which is not strongly dominated by grasses.

- PCT 1610 White Box - Black Cypress Pine shrubby woodland of the Western Slopes: This PCT was considered and excluded due to mismatch in canopy floristics (*Callitris endlicheri* not present) and landscape position of lower slopes and flats of the Central Western Slopes.
- PCT 1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter: This PCT was considered, it has a canopy of *Eucalyptus crebra* and *Brachychiton populneus* occurring with *Eucalyptus moluccana*, however *Eucalyptus albens* and *Eucalyptus albemol* are not identified as characteristic species. PCT 1691 is also described as occurring on coal bearing sedimentary geologies which are not present.

4.2.3 Description of PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

4.2.3.1 PCT Description

PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin is described in the NSW VIS (DPE 2023) as an Ironbark Open Forest with a moderately dense to sparse mid-stratum and a grass/forb ground stratum. It generally occurs on sandstone hills in the Cassilis; Merriwa; Scone area and is found in the Goulburn River NP; Durrigere SCA and in the hills west of Scone on elevation ranges from about 250 to 500 m. This PCT is not associated with any threatened ecological communities.

Within the Development Footprint this PCT replaces PCT 483 Grey Box x White Box grassy open woodland in areas of higher sandstone influence. The characteristics of PCT 1661 are summarised in **Table 4.3**.

Table 4.3 Overview of PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin Characteristics

PCTID	1661
PCT name	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Western Slopes Dry Sclerophyll Forest
Percent cleared value (%)	50
Condition States and Extent within Development Footprint (ha)	Condition Zone 1 – Scattered Trees: 6.07 ha Condition Zone 2 – Moderate to Low Condition Derived Native Grassland: 36.79 ha Condition Zone 3 – Low Condition Derived Native Grassland: 53.24 ha Total Area: 96.10 ha
Location	This PCT occurs in areas of sandstone influence, particularly around the edges of the Development Footprint and in lower elevation parts which have not been subject to nutrient enrichment associated with Basalt derived soils and geology.
Floristic Description – Canopy Stratum	Where a canopy stratum is present the dominant tree species are <i>Eucalyptus crebra</i> and <i>Allocasuarina luehmannii</i> with an absence of other eucalypts.
Floristic Description – Mid Stratum	The mid stratum is typically absent due to historical clearing and ongoing pasture improvement and cattle grazing.

PCTID	1661
Floristic Description - Ground Stratum	The understorey is dominated by grasses including <i>Sporobolus creber</i> , <i>Chloris ventricosa</i> , <i>Austrostipa verticillata</i> and <i>Eremophila debilis</i> with varying levels of exotics such as <i>Sida rhombifolia</i> , <i>Gomphocarpus fruticosus</i> and <i>Senecio madagascariensis</i> .

4.2.3.2 Condition states and Alignment with BC Act and EPBC Act Listed TECs

i. Condition Zone 1 – Scattered Trees

This condition zone represents the areas of the Development Footprint which contain a canopy of scattered eucalypts over an understorey composed of derived native grassland.

This PCT and condition zone do not correspond to any threatened ecological communities listed under the BC Act or the EPBC Act. A photograph of this condition zone is provided as **Photo 4.5**.



Photo 4.5 PCT 1661 Condition Zone 1 – Scattered Trees

ii. Condition Zone 2 – PCT 1661 Moderate to Low Condition Derived Native Grassland

This condition state represents the best quality areas of derived native grassland for this PCT, however are still in an overall low condition with a vegetation integrity score of <15.

These areas contained grazed native vegetation / modified pastures with no trees and low shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low cover and species richness of native ferns other native plants. These areas have been degraded to some extent by agricultural use and invasion of exotic species.

This PCT and condition zone do not correspond to any threatened ecological communities listed under the BC Act or the EPBC Act. A photograph of this condition zone is provided as **Photo 4.6**.



Photo 4.6 PCT 1661 Condition Zone 1 – Moderate to Low Derived Native Grassland

iii. Condition Zone 3 – PCT 1661 Low Condition Derived Native Grassland

This condition state represents the lowest derived native grassland condition state of PCT 1661 and is composed of areas of highly degraded agricultural land, which has been subject to high levels of pasture improvement and now contain a high cover of exotic flora species. There are no native trees and the understorey typically has a low cover of native species. This condition state represents the lowest condition zone of PCT 1661 composed of derived native grassland, with a very low vegetation integrity score.

This PCT and condition zone do not correspond to any threatened ecological communities listed under the BC Act or the EPBC Act. A photograph of this condition zone is provided as **Photo 4.7**.



Photo 4.7 PCT 1661 Condition Zone 1 – Low Condition Derived Native Grassland

4.2.3.3 Justification for PCT Selection

The NSW VIS describes PCT 1661 as an ironbark open forest with a moderately dense to sparse mid-stratum and a grass/forb ground stratum, occurring on sandstone hills.

The site vegetation corresponds with PCT 1661 as it has a canopy dominated by *Eucalyptus crebra*, occurs on similar topography to adjoining undisturbed areas which have *Callitris endlicheri* as a dominant sub-canopy species, occurs in areas with visible sandstone outcropping, associated with Narrabeen Sandstone geology, occurs in the Merriwa area, and is surrounded by the Goulburn River National Park and matches the elevation range for the PCT of 250 to 500 m.

The lineage for this PCT shows that it is replaced by two PCTs, including PCT 3768 Upper Hunter Ranges Enriched Ironbark Forest which corresponds floristically with the areas of PCT 1661 present and is mapped on the State Vegetation Type Map in areas adjoining the Development Footprint.

The following other PCTs were considered, but excluded from occurring from areas mapped as this PCT:

- PCT 1654 Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley: Considered and excluded due to mismatch in canopy floristics, specifically the lack of *Eucalyptus punctata* and *Angophora floribunda* within the Development Footprint and adjoining areas.
- PCT 1672 Red Ironbark - Grey Gum - Black Pine heathy woodland on sandstone ranges of the Sydney Basin: Considered and excluded due to floristic mismatch, including the lack of *Eucalyptus fibrosa* and *Eucalyptus punctata* within the Development Footprint.
- PCT 1674 Red Ironbark - Brown Bloodwood - Black Pine heathy open forest on sandstone ranges of the Sydney Basin: Considered and excluded due to lack of *Eucalyptus fibrosa* and *Corymbia trachyphloia*.

4.2.4 Other PCTs Surveyed within the Project Area

The following PCTs were surveyed as part of a larger Development Footprint which was subsequently reduced and will now be retained as a part of the impact avoidance measures implemented for the Project:

- PCT 1607 Blakely's Red Gum – Narrow-leaved Ironbark – Rough-barked Apple shrubby woodland of the upper Hunter: This PCT occurs in the south-western section of the Project Area along an ephemeral drainage line. The tree stratum is intact and dominated by *Angophora floribunda* and *Eucalyptus crebra* with *Allocasuarina luehmannii* as a sub-dominant. The shrub stratum is sparse where present and dominated by *Notelaea microcarpa* and *Ozothamnus diosmifolius*, and the understorey consists of grazed land dominated by *Microlaena stipoides* with a variety of other herbs and forbs. It does not correspond to any BC Act or EPBC Act listed TECs.
- PCT 1655 Grey Box – Slaty Box shrub – grass woodland in sandstone slopes of the upper Hunter and Sydney Basin: The surveyed areas of this PCT consist of a patch of remnant *Eucalyptus dawsonii* trees, the shrub stratum is sparse to absent and the understorey consists of grazed land dominated by grasses including *Austrostipa verticillata*, *Microlaena stipoides* and *Chloris truncata*. This patch will be retained within the northern part of the Development Footprint.

This PCT is associated with the Hunter Valley Foothills Slaty Gum Woodland in the Sydney Basin Bioregion vulnerable ecological community (VEC). There are floristic similarities between this PCT and the Central Hunter Valley Eucalypt Forest and Woodland which is listed as a CEEC under the EPBC Act, however the key diagnostic feature of occurring on lower hillslopes and low ridges or valley floors in undulating country on soil derived from Permian sedimentary rocks is not met, as this PCT occurs on the Wollar Road Soil Landscape, which is characterised by ironstone-rich Triassic sandstone of the Narrabeen Group adjacent to basalt (NSW OEH 2018).

4.2.5 Cleared Land and Waterbodies

The Development Footprint contains approximately 2.01 ha mapped as cleared land which is mostly composed of vehicle tracks, 0.17 ha mapped as exotic vegetation around the existing dwelling and 1.6 ha mapped as waterbodies associated with farm dams.

4.3 Threatened Ecological Communities

One TEC, the critically endangered White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs within the Development Footprint. This CEEC corresponds to areas mapped as PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley. The BC Act listing of this CEEC includes all mapped condition zones, as the final determination identifies that it is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community independent of their condition be covered by the listing under the BC Act.

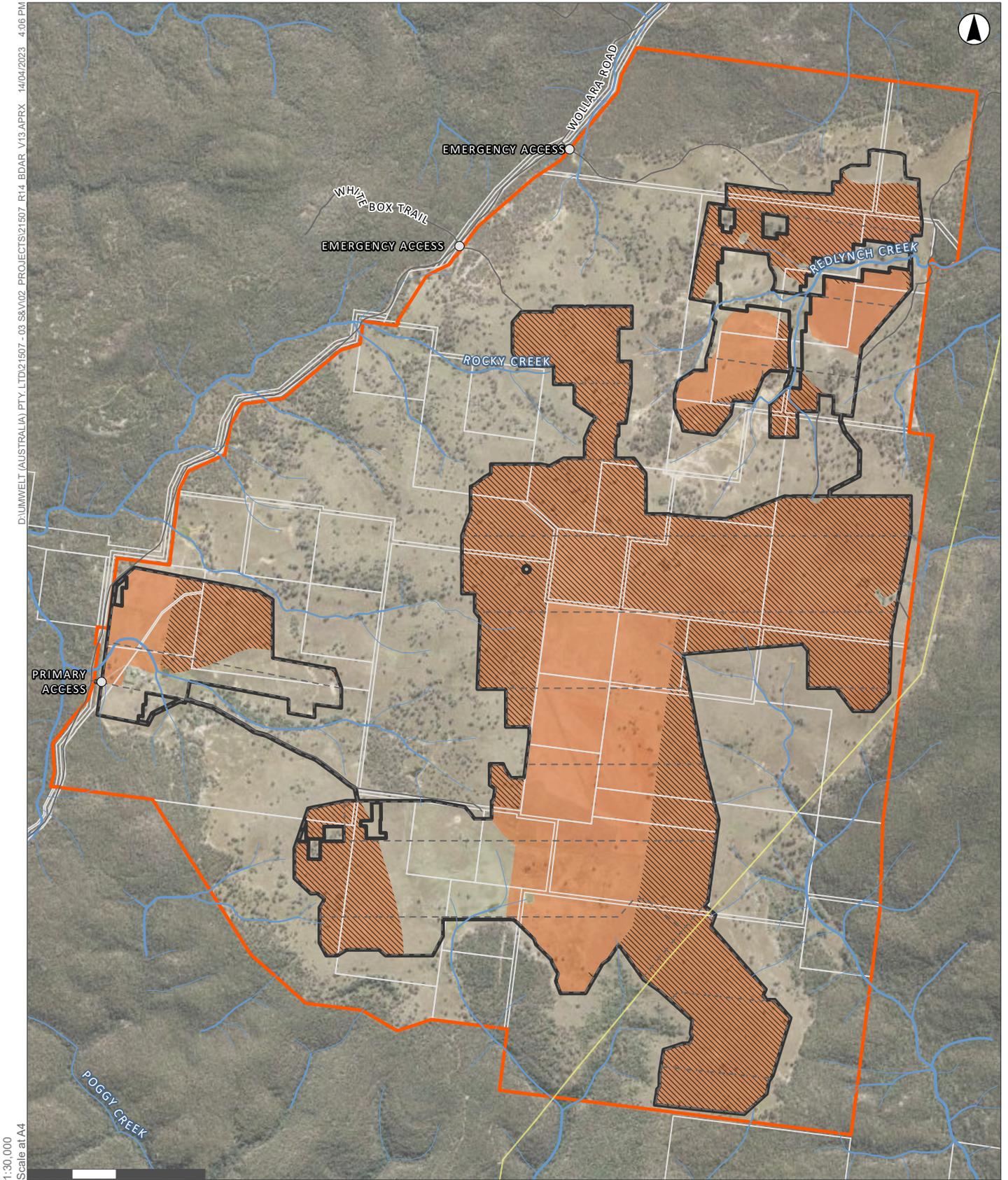
The EPBC Act listing for this CEEC includes the following condition zones:

- PCT 483 Condition Zone 1 – Scattered Trees (excluding those areas which are surrounded by low condition derived native grassland vegetation zone and contain a predominantly exotic understorey).
- PCT 483 Condition Zone 2 – Moderate condition derived native grassland.
- PCT 483 Condition Zone 3 – Moderate to low condition derived native grassland.
- For the vegetation condition zone, PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland, the condition threshold under the EPBC Act for this CEEC is not met. This due to these patches not having a predominantly native understorey, as determined by the floristic plot surveys completed.

Threatened ecological community associations for the PCTs observed are discussed in **Section 4.2** of this Report. The details of the threatened ecological communities identified within the Development Footprint are also listed in **Table 4.4** and the extent of each TEC is mapped in **Figure 4.3**.

Table 4.4 TECs within the Development Footprint

TEC Name	Profile ID (from TBDC)	Act and Listing Status	Associated PCTs and vegetation condition zones within the Development Footprint	Area within Development Footprint (ha)
<p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions</p>	10837	<p>Critically Endangered Ecological Community Listed under the BC Act</p>	<p>PCT 483 Condition Zone 1 – Scattered Trees (23.64 ha)</p> <p>PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland (168.48 ha)</p> <p>PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland (308.37 ha)</p> <p>PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland (199.14 ha)</p>	699.63 ha
<p>White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands</p>	20392	<p>Critically Endangered Ecological Community Listed under the EPBC Act</p>	<p>PCT 483 Condition Zone 1 – Scattered Trees (excluding areas surrounded by PCT 483 Condition Zone 4) (19.26 ha)</p> <p>PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland (168.48 ha)</p> <p>PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland (308.37 ha)</p>	496.11 ha



0 500 1,000 Meters

- Legend**
- Access Points
 - - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Electricity Transmission Line
 - Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area

Threatened Ecological Communities within the Development Footprint

- ▨ White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland VEC - EPBC Act
- ▨ White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC - BC Act

FIGURE 4.3

Threatened Ecological Communities

4.4 Vegetation Zones

A description of each vegetation Condition Zone within the Development Footprint is provided in **Section 4.2** of this Report. A map of the vegetation condition zones is provided in **Figure 4.2** and the details of each Condition Zone including area, patch size class and the BAM survey plots required and completed are provided in **Table 4.5**.

Table 4.5 Vegetation Condition Zones and patch sizes

Vegetation Condition Zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	Plot IDs of vegetation integrity plots used in assessment
PCT 483 - 1	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered Trees	23.64	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	4	5	P18, P20, P21, P22, P45
PCT 483 - 2	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate condition derived native grassland	168.48	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	6	18	P6, P8, P44, P51, P52, P61, P62, P63, P64, P65, P66, P67, P68, P69, P79, P80, P81, P82
PCT 483 - 3	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate to low condition derived native grassland	308.37	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	7	19	P7, P9, P10, P11, P16, P17, P34, P36, P37, P41, P53, P55, P56, P57, P58, P70, P73, P74, P75
PCT 483 - 4	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Low condition derived native grassland	199.14	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	6	10	P15, P38, P39, P40, P42, P46, P54, P83, P84, P85
PCT 1661 - 1	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	3	4	P2, P23, P26, P43

Vegetation Condition Zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	Plot IDs of vegetation integrity plots used in assessment
PCT 1661 - 2	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Moderate to low condition derived native grassland	36.79	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	4	11	P1, P4, P5, P27, P30, P50, P59, P60, P76, P77, P78
PCT 1661 - 3	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Low condition derived native grassland	53.24	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	5	5	P3, P28, P29, P71, P72

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation Integrity Survey Plots

Details on the number of BAM plots (floristic and vegetation integrity survey plots) required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in **Table 4.6**.

The vegetation integrity plot survey locations are shown in **Figure 2.1**. A summary of the BAM VI plot data is contained in **Appendix C** and a digital copy of the data has been forwarded to BCD.

4.5.2 Scores

The vegetation integrity condition scores for the BAM Plots completed are provided in **Table 4.6**. This table represents the combined scores from all plots completed for each vegetation condition zone, including the vegetation integrity score and the presence of hollow bearing trees.

Table 4.6 Vegetation Integrity Condition Scores

Vegetation Zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
PCT 483 Condition Zone 1 – Scattered Trees	80.2	85.1	69.6	78	Yes
PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland	58.1	67.5	9.3	33.1	No
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	61.5	65.5	0.5	12.4	No
PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland	37.5	36	0.7	9.9	No
PCT 1661 Condition Zone 1 – Scattered Trees	59.5	27.6	81	51.1	Yes
PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland	40.6	17.1	3.3	13.2	No
PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland	32.3	16.1	0.1	3.3	No

4.5.3 Use of Benchmark Data

The V1.1 Benchmarks (<https://www.lmbc.nsw.gov.au/bamcalc/app/assets/version1.1-benchmarks.csv>) were utilised for this assessment in accordance with the current transitional arrangements for BAM C Cases in progress on 31 January 2023 (case opened 10/05/2022). Screenshots of the benchmark values used are provided in **Appendix D**.

5.0 Habitat Suitability for Threatened Species

5.1 Identification of Threatened Species for Assessment

5.1.1 Ecosystem Credit Species

The ecosystem credit species predicted to occur on or use the Development Footprint are identified in **Table 5.1**. Justification is provided for any species from the BAM-C automatically populated list excluded from assessment.

Table 5.1 Predicted Ecosystem Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Regent Honeyeater (Non-important habitat)	<i>Anthochaera phrygia</i>	CE	CE	Yes	BAM-C	-	Yes	Yes	PCT 483 all condition zones PCT 1661 all condition zones	High
Glossy Black-Cockatoo (Foraging habitat)*	<i>Calyptorhynchus lathami</i>	V	-	Yes	Observed during surveys	Presence of Allocasuarina and Casuarina species	Yes / Partial	No <i>Casuarina</i> or <i>Allocasuarina</i> present within DNG Condition zones	PCT 483 Scattered PCT 1661 Scattered	High
Speckled Warbler	<i>Chthonicola sagittata</i>	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	V	E	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Black Falcon	<i>Falco subniger</i>	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Little Lorikeet	<i>Glossopsitta pusilla</i>	V	-	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Painted Honeyeater	<i>Grantiella picta</i>	V	V	No	BAM-C	Mistletoes present at a density of greater than five mistletoes per hectare	Partial	Excluded from PCT 483 DNG condition zones as habitat constraints not met	PCT 483 scattered trees condition zone	Moderate
White-throated Needletail	<i>Hirundapus caudacutus</i>	-	V	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Square-tailed Kite (Foraging habitat)	<i>Lophoictinia isura</i>	V	-	Yes	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Turquoise Parrot	<i>Neophema pulchella</i>	V	-	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Barking Owl (Foraging habitat)	<i>Ninox connivens</i>	V	-	Yes	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Scarlet Robin	<i>Petroica boodang</i>	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Flame Robin	<i>Petroica phoenicea</i>	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
New Holland Mouse	<i>Pseudomys novaehollandiae</i>	-	V	No	Supplementary SEARs	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Grey-headed Flying-fox (Non-breeding habitat)	<i>Pteropus poliocephalus</i>	V	V	Yes	Supplementary SEARs	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

5.1.2 Species Credit Species

5.1.2.1 Predicted Flora Species Credit Entities

The flora species credit species predicted to occur on the Development Footprint are identified in **Table 5.2**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

For threatened flora species NSW, DPIE (2020b) identify that only the suitable habitat for the target species within the Development Footprint needs to be surveyed and includes areas in the Development Footprint supporting any listed habitat constraints and PCTs associated with that species in the TBDC. In this context NSW DPIE (2020b) also identify that suitable habitat for threatened flora may encompass entire PCTs or be restricted to niches determined with consideration of habitat constraints, land use history, disturbance events and climatic factors. The TBDC and the Threatened Species Profile website, along with appropriate published or peer-reviewed references and/or data must be used to determine suitable habitat (NSW DPIE 2020b).

The Draft Land Categorisation Mapping for the Development Footprint also identifies large areas of Category 1 - Exempt Land. Areas of PCT 483 correspond to a CEEC and are therefore excluded from consideration as Category 1 Exempt Land under the BAM, however areas of derived native grassland condition zones for PCT 1661 all correspond to Category 1 - Exempt Land. Surveys within PCT 1661 areas which correspond to Category 1 – Exempt Land have been undertaken as a precautionary measure where field habitat assessment confirmed the potential presence of suitable habitat for the target species.

Table 5.2 Predicted Flora Species Credit Species

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
<i>Commersonia procumbens</i>	<i>Commersonia procumbens</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Piliga Sandstone	No	Habitat constraints not met as the Development Footprint is not on Piliga Sandstone.	None
<i>Commersonia rosea</i>	<i>Commersonia rosea</i>	E	E	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	-	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment	<i>Cymbidium canaliculatum</i>	E Pop.	Not listed	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Epiphytic in a range of eucalypts, Acacia and Angophora, Fallen/standing dead timber including logs Hunter catchment as defined by Australia's River Basins (Geoscience Australia 1997)	Yes	-	PCT 483 Scattered Trees Condition Zone PCT 1661 Scattered Trees Condition Zone

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
Pine Donkey Orchid	<i>Diuris tricolor</i>	V	Not listed	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	N/A	Yes	-	PCT 1661 Scattered Trees Parts of PCT 1661 Moderate to Low Derived Native Grassland
Fairy Bells	<i>Homoranthus darwinioides</i>	V	V	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	N/A	Yes		PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
Large-leafed Monotaxis	<i>Monotaxis macrophylla</i>	E	Not listed	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	N/A	No although limited precautionary surveys undertaken as part of habitat searches	The Development Footprint is assessed as too disturbed to support this species. This is due to a long history of agricultural land use including clearing, pasture improvement, grazing, exclusion of natural fire regimes through fuel reduction and lack of suitable microhabitats (rocky ridges).	PCT 483 & PCT 1661 Scattered Trees Condition Zones PCT 483 Moderate Derived Native Grassland and Moderate to Low Derived Native Grassland Condition Zones and PCT 483 Scattered Trees Condition Zone where surrounded by the above derived native grassland zones. PCT 1661 Scattered Trees and PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
<i>Ozothamnus tessellatus</i>	<i>Ozothamnus tessellatus</i>	V	V	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	N/A	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
Scant Pomaderris	<i>Pomaderris queenslandica</i>	E	Not listed	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	N/A	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present

5.1.2.2 Threatened Fauna Candidate Species

The fauna species credit species predicted to occur on the Development Footprint are identified in **Table 5.3**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species. Species credit fauna associated with PCT 1655 are included in the assessment in **Table 5.3** and were subject to surveys. It is noted that PCT 1655 has subsequently been removed from the Development Footprint and will not be impacted by the Project.

The 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (NSW OEH 2018) defines potential habitat as the area of the Development Footprint that support any listed habitat constraints and PCTs associated with the target species as per the TBDC. This approach to habitat assessment and surveying has been adopted for target threatened microbat species.

Table 5.3 Predicted Threatened Fauna Species Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Regent Honeyeater (Important Habitat)	<i>Anthochaera phrygia</i>	CE	CE	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	-	Yes	N/A	Assessed by Important Habitat Mapping
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	V	V	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Rocky areas or within 50 m of rocky areas	Yes	N/A	All PCTs and Condition Zones with surveys stratified to areas with rocks
Gang-gang Cockatoo (Breeding Habitat)	<i>Callocephalon fimbriatum</i>	V	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Hollow bearing trees with hollows >9 cm	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Glossy Black-Cockatoo (Breeding Habitat)	<i>Calyptorhynchus lathamii</i>	V	Not listed	Yes	<input type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input checked="" type="checkbox"/> Current survey	Hollow bearing trees with hollows >15 cm >8 m AGL	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels	No	There are records for this species on the BioNet Atlas in areas adjacent to the Development Footprint, however there are no associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	-
Striped Legless Lizard	<i>Delma impar</i>	V	V	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	-	Yes, although it is noted that this species has been previously incorrectly regarded as synonymous with the recently described Hunter Valley Delma (<i>Delma vescolineata</i>)	-	All PCTs and Condition Zones with surveys stratified to areas with rocks
Little Eagle (Breeding Habitat)	<i>Hieraetus morphnoides</i>	V	Not listed	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Potential nest trees - live (occasionally dead) large old trees within vegetation)	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Swift Parrot (Important Habitat)	<i>Lathamus discolor</i>	E	CE	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	As per mapped areas	No	The Development Footprint is not within a mapped important habitat area.	-
Square-tailed Kite (Breeding Habitat)	<i>Lophoictinia isura</i>	V	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Potential nest trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Little Bent-winged Bat	<i>Miniopterus australis</i>	V	Not listed	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	No	Habitat constraints are not present within Development Footprint	-
Large Bent-winged Bat (Breeding Habitat)	<i>Miniopterus orianae oceanensis</i>	V	Not listed	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	No	No associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	-

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Barking Owl (Breeding Habitat)	<i>Ninox connivens</i>	V	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Hollow bearing trees with hollows >20 cm diameter and >4 m AGL	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Powerful Owl (Breeding Habitat)	<i>Ninox strenua</i>	V	Not listed	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Hollow bearing trees with hollows >20 m diameter	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Greater Glider	<i>Petauroides volans</i>	Not listed	V	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Hollow bearing trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	Not listed	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey		Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	E	V	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	No	Habitat constraints not met and habitat degraded.	-
Koala	<i>Phascolarctos cinereus</i>	V	V	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Presence of koala use trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Grey-headed Flying-fox (Breeding Habitat)	<i>Pteropus poliocephalus</i>	V	V	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Breeding camps	No	Habitat constraints / breeding camps are not present.	-
Masked Owl (Breeding Habitat)	<i>Tyto novaehollandiae</i>	V	Not listed	Yes	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Hollow bearing trees with hollows >20 cm diameter	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V	Not listed	No	<input type="checkbox"/> BAM-C <input checked="" type="checkbox"/> TBDC / BioNet Atlas <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines, tunnels, old buildings or sheds	No	There are records for this species on the BioNet Atlas in areas adjacent to the Development Footprint, however there are no associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	No
Key to Listing Status V = Vulnerable, E = Endangered, CE = Critically Endangered.									

5.2 Presence of Candidate Species Credit Species

5.2.1 Threatened Flora Species

No threatened flora species were observed within the Development Footprint and targeted surveys were completed for all candidate threatened flora species. A summary of the methods used and determination of presence for candidate threatened flora species credit species is provided in **Table 5.4**.

Table 5.4 Determining the Presence of Candidate Flora Species Credit Species on the Development Footprint

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required?
		BC Act	EPBC Act			
-	<i>Commersonia rosea</i>	E	E	Targeted threatened species survey	No	No
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment	<i>Cymbidium canaliculatum</i>	EP	-	Targeted threatened species survey	No	No
Pine Donkey Orchid	<i>Diuris tricolor</i>	V	-	Targeted threatened species survey	No	No
Fairy Bells	<i>Homoranthus darwinioides</i>	V	V	Targeted threatened species survey	No	No
Large-leafed Monotaxis	<i>Monotaxis macrophylla</i>	E	-	Targeted threatened species survey	No	No
-	<i>Ozothamnus tessellatus</i>	V	V	Targeted threatened species survey	No	No
Scant Pomaderris	<i>Pomaderris queenslandica</i>	E	-	Targeted threatened species survey	No	No

5.2.2 Threatened Fauna Species

The following threatened fauna species have been assessed for species credits within the Development Footprint:

- Regent Honeyeater (not observed / assessed by mapped important habitat).
- Barking Owl.

A summary of the methods used and determination of presence for candidate threatened fauna species credit species is provided in **Table 5.5**. Based on existing BioNet Atlas records (DPE 2023a) it is also considered that the Large-eared Pied Bat and Eastern Cave Bat may utilise the Development Footprint for foraging, however no breeding habitat or PCTs associated with these species will be impacted by the Project. These two species are not associated with any PCTs which will be impacted by the Project.

Table 5.5 Determining the Presence of Candidate Fauna Species Credit Species on the Development Footprint

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Regent Honeyeater Mapped Important Habitat	<i>Anthochaera phrygia</i>	CE	CE	Within important habitat mapped area	Not observed during surveys / assessed via important habitat mapping	Yes
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	V	V	Targeted threatened species survey	No	No
Gang-gang Cockatoo Breeding Habitat	<i>Callocephalon fimbriatum</i>	V	Not listed	Targeted threatened species survey	No	No
Glossy Black-Cockatoo Breeding Habitat	<i>Calyptorhynchus lathami</i>	V	Not listed	Targeted threatened species survey	No	No
Striped Legless Lizard	<i>Delma impar</i>	V	V	Targeted threatened species survey	No	No, it is noted that this species has been previously incorrectly regarded as synonymous with the currently unlisted and recently described Hunter Valley Delma (<i>Delma vescolineata</i>). Both species were not observed during surveys.
Little Eagle Breeding Habitat	<i>Hieraaetus morphnoides</i>	V	Not listed	Targeted threatened species survey	No	No
Square-tailed Kite Breeding Habitat	<i>Lophoictinia isura</i>	V	Not listed	Targeted threatened species survey	No	No
Barking Owl Breeding Habitat	<i>Ninox connivens</i>	V	Not listed	Targeted threatened species survey	Yes	Yes
Powerful Owl Breeding Habitat	<i>Ninox strenua</i>	V	Not listed	Targeted threatened species survey	No	No

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Greater Glider	<i>Petauroides volans</i>	Not listed	V	Targeted threatened species survey	No	No
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	Not listed	Targeted threatened species survey	No	No
Koala	<i>Phascolarctos cinereus</i>	V	V	Targeted threatened species survey	No	No
Masked Owl Breeding Habitat	<i>Tyto novaehollandiae</i>	V	Not listed	Targeted threatened species survey	No	No

5.3 Threatened Species Surveys

A summary of the targeted surveys completed for candidate threatened flora species is provided in **Table 5.6**, further details of the threatened flora surveys completed, and guidelines applied are provided in **Section 2.3** of this Report.

Table 5.6 Summary of Species Credit Threatened Flora Surveys Completed

Common Name	Scientific Name	Threatened Flora Species Surveys			Present	Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey Effort (hours & no people)		
-	<i>Commersonia rosea</i>	Parallel field traverses	<input checked="" type="checkbox"/> Yes January, February 2022	15.25 person hours completed by up to 2 people over multiple days	No	No
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment	<i>Cymbidium canaliculatum</i>	Parallel field traverses / phase 1 grid-based search	<input checked="" type="checkbox"/> Yes January, February 2022	Phase 1 grid search: 115 person hours completed by up to 3 people over multiple days Other parallel field traverses: 15.25 person hours completed by up to 2 people over multiple days	No	No

Common Name	Scientific Name	Threatened Flora Species Surveys			Present	Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey Effort (hours & no people)		
Donkey Orchid	<i>Diuris tricolor</i>	Parallel field traverses	<input checked="" type="checkbox"/> Yes October 2022	12.5 hrs x 2 people	No	No
Fairy Bells	<i>Homoranthus darwinioides</i>	Parallel field traverses	<input checked="" type="checkbox"/> Yes November 2022	10.5 hrs x 2 people	No	No
Large-leafed Monotaxis	<i>Monotaxis macrophylla</i>	Parallel field traverses / phase 1 grid-based search	<input checked="" type="checkbox"/> Yes January, February 2022	Phase 1 grid search: 115 person hours completed by up to 3 people over multiple days Other parallel field traverses: 15.25 person hours completed by up to 2 people over multiple days	No	No
-	<i>Ozothamnus tessellatus</i>	Parallel field traverses	<input checked="" type="checkbox"/> Yes October 2022	12.5 hrs x 2 people	No	No
Scant Pomaderris	<i>Pomaderris queenslandica</i>	Parallel field traverses	<input checked="" type="checkbox"/> Yes November 2021	10.5 hrs x 2 people	No	No

A summary of the targeted surveys completed for candidate threatened fauna species is provided in **Table 5.7**, further details of the threatened fauna surveys completed, survey timing and guidelines followed are provided in **Section 2.4** of this Report.

Table 5.7 Summary of Species Credit Threatened Fauna Surveys Completed

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	Rock rolling searches	<input checked="" type="checkbox"/> Yes	Rock rolling searches – 2 days x 2 people	No

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Gang-gang Cockatoo Breeding Habitat	<i>Callocephalon fimbriatum</i>	Diurnal census during breeding period	<input checked="" type="checkbox"/> Yes	44.25 hrs x 2 people	No
Glossy Black-Cockatoo Breeding Habitat	<i>Calyptorhynchus lathami</i>	Diurnal census during breeding period	<input checked="" type="checkbox"/> Yes	66.75 hrs x 2 people	No
Striped Legless Lizard	<i>Delma impar</i>	Rock rolling searches	<input checked="" type="checkbox"/> Yes	Rock rolling searches – 2 days x 2 people	No
Little Eagle Breeding Habitat	<i>Hieraaetus morphnoides</i>	Diurnal census during breeding period	<input checked="" type="checkbox"/> Yes	75.25 hrs x 2 people	No
Square-tailed Kite Breeding Habitat	<i>Lophoictinia isura</i>	Diurnal census during breeding period	<input checked="" type="checkbox"/> Yes	59.25 hrs x 2 people	No
Barking Owl Breeding Habitat	<i>Ninox connivens</i>	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	<input checked="" type="checkbox"/> Yes	Diurnal surveys: 121 hrs x 2 people Nocturnal Surveys: 21.5 hrs x 2 people	Yes
Powerful Owl Breeding Habitat	<i>Ninox strenua</i>	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	<input checked="" type="checkbox"/> Yes	Diurnal surveys: 61.75 hrs x 2 people Nocturnal Surveys: 14.5 hrs x 2 people	No

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Greater Glider	<i>Petauroides volans</i>	Spotlighting	<input checked="" type="checkbox"/> Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Squirrel Glider	<i>Petaurus norfolcensis</i>	Camera trapping and spotlighting	<input checked="" type="checkbox"/> Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Koala	<i>Phascolarctos cinereus</i>	Spotlighting and camera trapping	<input checked="" type="checkbox"/> Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Masked Owl	<i>Tyto novaehollandiae</i>	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	<input checked="" type="checkbox"/> Yes	Diurnal surveys: 61.75 hrs x 2 people Nocturnal Surveys: 14.5 hrs x 2 people	No

5.4 Expert Reports and of More Appropriate Local Data

No expert reports were utilised in place of targeted surveys for the purposes of this assessment. This assessment has also not relied upon alternative data (more appropriate local data) to assess habitat suitability. Area or Count, and Location of Suitable Habitat for a Species Credit Species (a Species Polygon).

5.4.1 Results for BC Act Listed Species Credit Entities

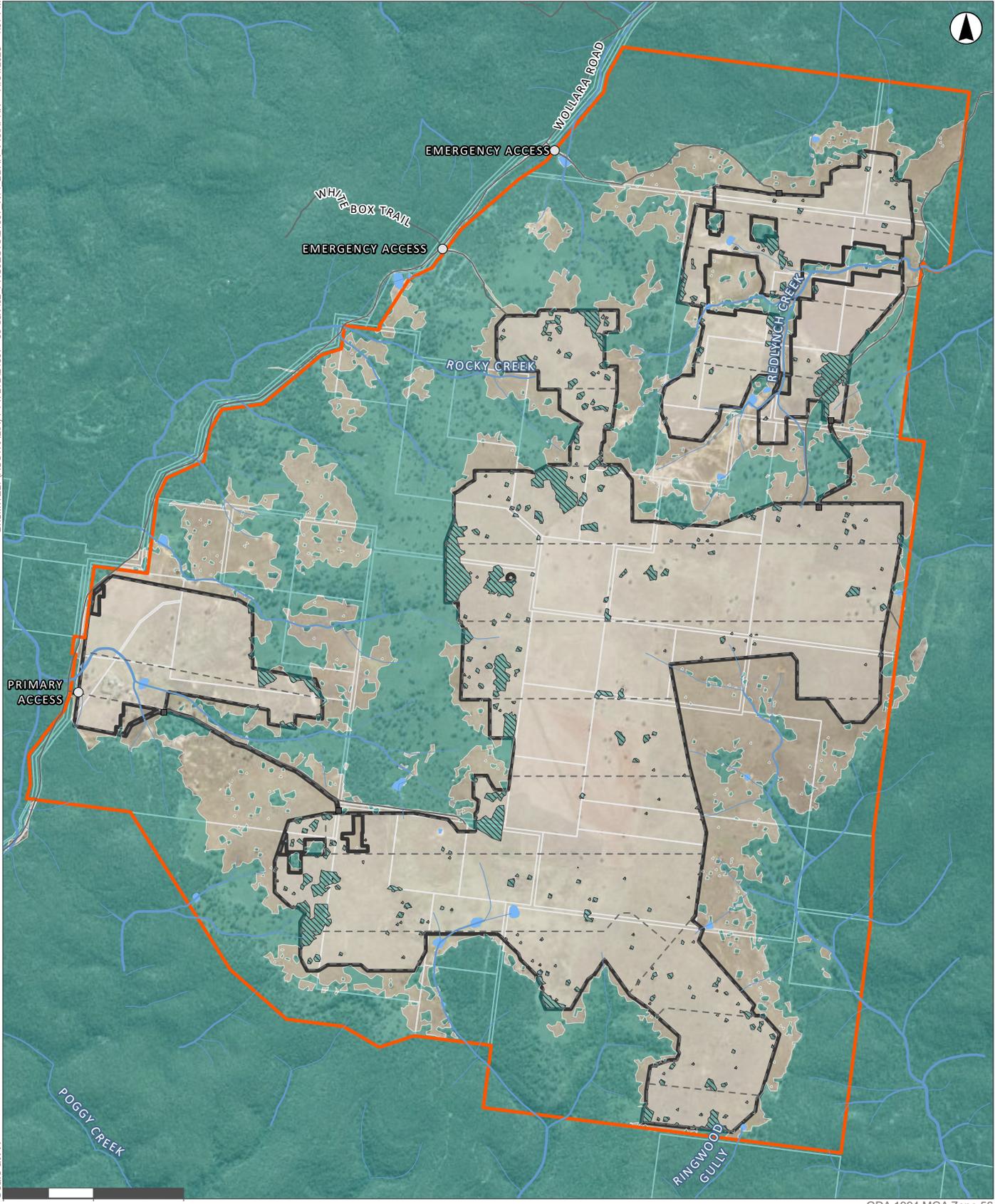
5.4.1.1 Regent Honeyeater (*Anthochaera phrygia*) Species Polygon

Mapped important habitat for this species is present within the Development Footprint, the species polygon details are provided in **Table 5.8** and the species polygon is mapped in **Figure 5.1**.

Table 5.8 Regent Honeyeater Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	Very High (3)
SAIL Entity	Yes, mapped important habitat areas
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Mapped important habitat areas
Extent of suitable habitat present	PCT 483 Condition Zone 1 – Scattered Trees = 16.89 ha PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 11.92 ha PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 5.87 ha PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 2.38 ha PCT 1661 Condition Zone 1 – Scattered Trees = 4.04 ha PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland = 3.42 ha PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland = 0.44 ha Total = 44.96 ha
TBDC species specific recommendations	<p>If the Development Footprint is within a mapped area, no survey is required for that species and it is assumed present. The part of the Development Footprint within the important habitat map forms the species polygon used to generate species credits. Where only part of the Development Footprint is mapped as important habitat, the remaining areas are assessed for ecosystem credits.</p> <p>BCD has advised that PCT condition zones containing derived native grassland must be included within the species polygon where they overlap with mapped important habitat within the Development Footprint.</p> <p>This approach has been applied as shown in Figure 5.1. Species was not observed during any surveys.</p>

Information Required	Species Polygon Details
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	PCT 483 Condition Zone 1 – Scattered Trees = 78 PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1 PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 12.4 PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9 PCT 1661 Condition Zone 1 – Scattered Trees = 51.1 PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland = 13.2 PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland = 3.3



GDA 1994 MGA Zone 56

- Legend**
- Gate
 - Access Points
 - - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area
 - ▨ Regent Honeyeater Species Polygon
 - ▨ Regent Honeyeater Important Habitat Map

FIGURE 5.1

Candidate Species Credit Species Records and Species Polygons - Regent Honeyeater

5.4.1.2 Barking Owl (*Ninox connivens*)

The Barking Owl was detected within the Development Footprint during surveys completed on the following dates:

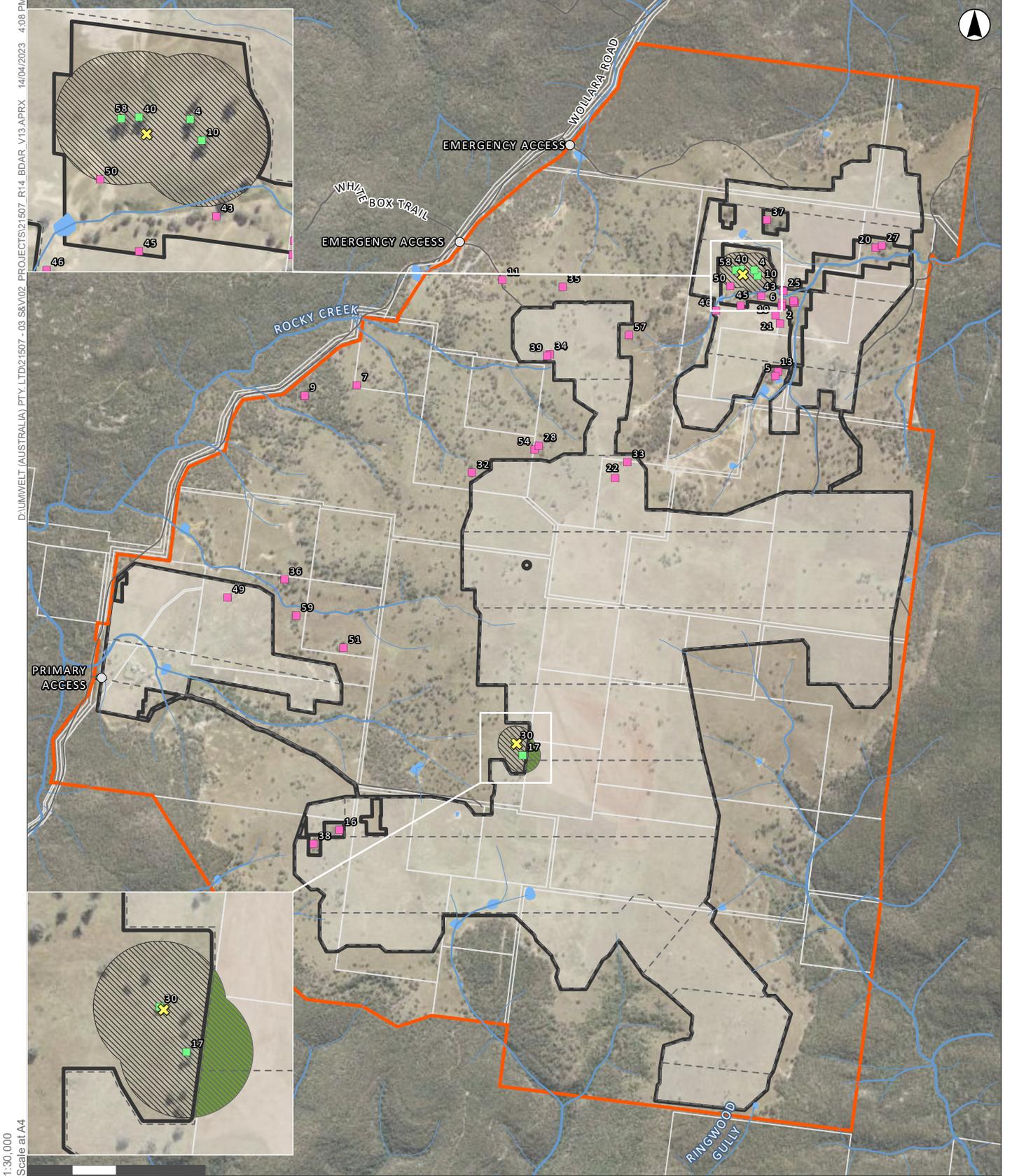
- 23 August 2021 – One Barking Owl calling in response to call playback within the vicinity of hollow-bearing trees 17 and 30. These trees were observed to contain potentially suitable characteristics for breeding and have been used for the purposes of mapping the species polygon.
- 30 August 2021 – one Barking Owl was observed on dusk near hollow-bearing tree numbers 4, 10, 40 and 58. It came in quickly to verbal calling. A second Barking Owl was heard calling to the north-west of the individual observed outside of the Development Footprint. No individuals were observed directly existing from a hollow, however hollow-bearing trees 4, 10, 40 and 58 were observed from the ground to contain characteristics suitable for breeding and the individual observed was displaying territorial behaviour during the breeding season. These trees have been used for the purposes of mapping the species polygon.
- 7 December 2021 – a pair of Barking Owls were again heard calling in response to call playback within the vicinity of hollow bearing trees 17 and 30.
- Comprehensive targeted nocturnal survey including quiet listening and call playback throughout the remainder of the site did not detect any barking owl activity in other areas.

All of the trees where the Barking Owl was observed will be retained, and the Project will only impact highly disturbed grazing land within the buffer to one tree in the central part of the Development Footprint. A compensatory buffer on the western side of this tree will be retained to ensure that the suitability of the tree as nesting habitat is retained. The species polygon details are provided in **Table 5.9** and the species polygon is mapped in **Figure 5.2**.

Table 5.9 Barking Owl Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	High (2)
SAIL Entity	No
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Suitable hollow trees where activity detected during the breeding season.
Extent of suitable habitat present	PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 1.2 ha PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 0.01 ha

Information Required	Species Polygon Details
<p>TBDC species specific recommendations</p>	<p>The TBDC identifies that for the assessment of Barking Owl breeding habitat:</p> <p>Where any known nest tree(s) occurs on site (e.g., known from existing data, studies or other documented evidence), a species polygon providing a circular buffer with a 100 m RADIUS should be drawn around the known nest tree(s).</p> <p>In addition, or where there are no known nest trees on site, assessors should apply the following process:</p> <ol style="list-style-type: none"> 1. Look for SIGNS OF BREEDING on site as follows; suitable habitat AND (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest. 2. Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees are living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. 3. Where potential nest trees are identified on site then, night monitoring at the identified potential nest locations for a minimum of 2 nights should be undertaken to detect the presence of any owl of this species using a potential nest tree or demonstrating behaviour focussed on a potential nest tree (e.g. investigating the hollow or roosting within 10 m). NSW DPE are currently developing survey guidance for threatened bird species. In the interim, assessors must undertake species surveys using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements). 4. If monitoring of potential nest trees detects this owl species using, or demonstrating behaviour focused on the trees (e.g., investigation of the hollow or roosting within 10 m) on site, the species polygons should be drawn around those trees (i.e. the identified potential nest trees where any owl of this species is observed using or focusing behaviour around the tree). The species polygons should be circular in shape and must include a buffer radius of 100 m around each tree. The purpose of the buffer is to minimise disturbance/avoid clearing, for a development application, or to conserve and improve habitat, for a biodiversity stewardship agreement, within the area essential for breeding. This includes habitat suitable for male roosts, feeding/grooming perches and fledgling requirements. It does not account for foraging habitat. The species uses paddock trees to extend foraging area from intact woodland. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.
<p>Habitat condition (vegetation integrity score for each vegetation zone in the polygon)</p>	<p>PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1</p> <p>PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9</p>



1:30,000
Scale at A4

- Legend**
- Access Points
 - - Proposed Access Tracks
 - - Existing Roads and Tracks
 - ▭ Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area

- ✕ Barking Owl Observation Locations
- Hollow Bearing Trees >20cm Opening (no Barking Owl activity detected)
- Hollow Bearing Trees >20cm Opening (where Barking Owl activity detected)
- ▨ Barking Owl Potential Nest Tree Buffer (100m)
- Barking Owl Species Polygon

FIGURE 5.2
Barking Owl Observation Locations

5.4.1.3 Large-eared Pied-bat (*Chalinolobus dwyeri*)

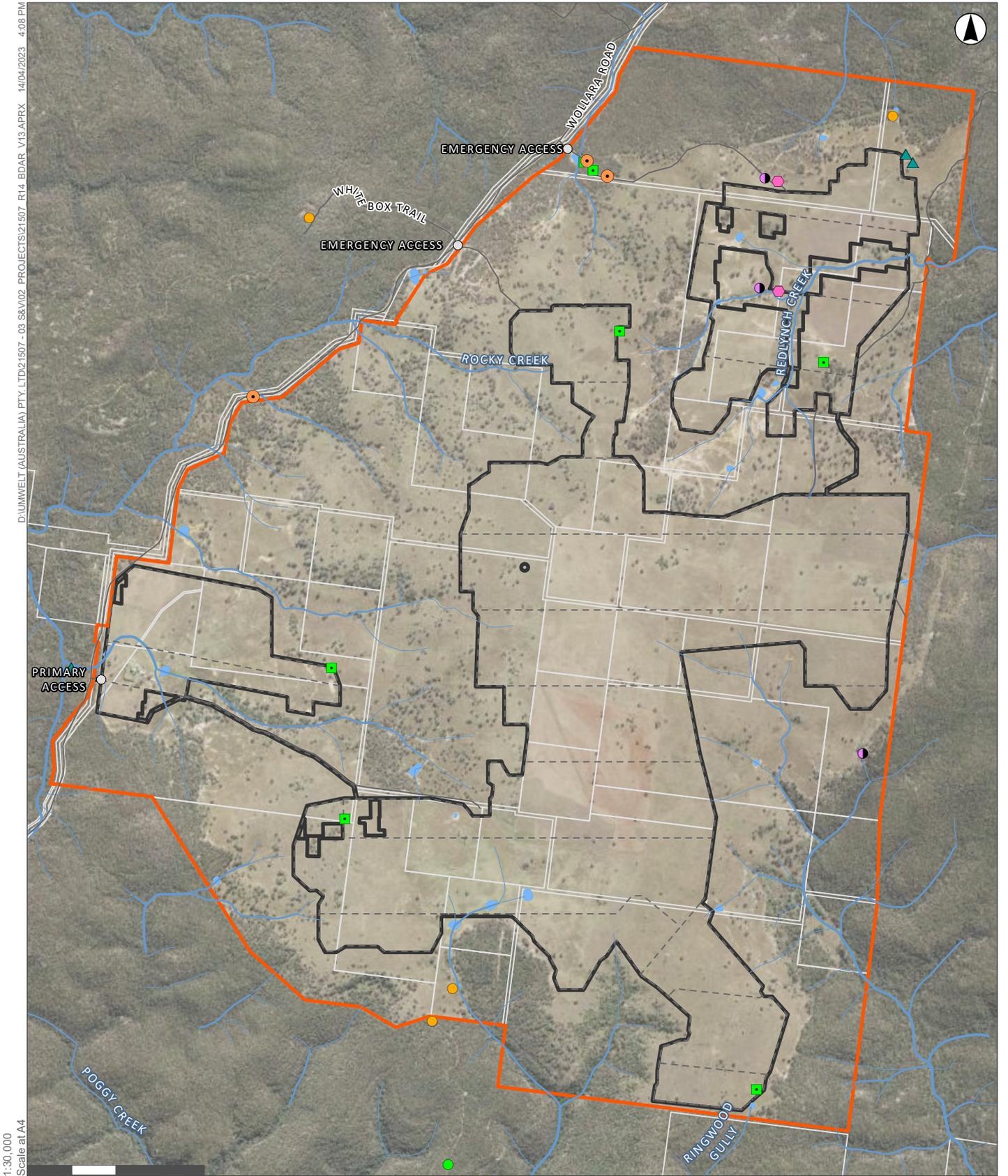
There are four (4) previous records for this species adjacent to the Development Footprint on the BioNet Atlas (NSW DPE 2023a), these records are mapped in **Figure 5.3**. No suitable breeding habitat for this species has been observed within the Development Footprint or within 100 m of the Development Footprint. Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Breeding habitat is considered a potential serious and irreversible impact (SAII) under the BAM. Aerial photograph analysis identified that these habitat features are not present within 100 m of the Development Footprint and site surveys have confirmed that these features are not present within the Development Footprint.

There are no PCTs associated with this species that will be impacted by the Project and a species polygon is therefore not required.

5.4.1.4 Eastern Cave Bat (*Vespadelus troughtoni*) Species Polygon

There is one previous record for this species to the south of the Development Footprint on the BioNet Atlas (NSW DPE 2023a), this record is mapped in **Figure 5.3**. Potential calls from this species were recorded during ultrasonic call recording surveys using Anabat detectors. It is noted that this species cannot be differentiated from the Little Forest Bat (*Vespadelus vulturinus*) by call between 49–53 kHz where they overlap in frequency in locations where they are sympatric, such as the Project Area. This species may be present, however species polygons for foraging habitat should align with PCTs on the Development Footprint to which the species is associated that are within 2 km of identified potential roost habitat features. There are no PCTs associated with this species that will be impacted by the Project and a species polygon is therefore not required.

The TBDC identifies that potential breeding habitat is a potential SAII entity and is assessed as PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Aerial photograph analysis identified that these habitat features are not present within 100 m of the Development Footprint and site surveys have confirmed that these features are not present within the Development Footprint.



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GDA 1994 MGA Zone 56

- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Waterbodies
 - Development Footprint
 - Project Area

- Ecosystem Credit Species Records**
- Diamond Firetail (7)
 - Dusky Woodswallow (3)
 - ▲ Glossy Black-Cockatoo (3)
 - Little Lorikeet (3)
 - White-throated Needle-tail (2)
- Bionet Search Records**
- Eastern Cave Bat
 - Large-eared Pied Bat

FIGURE 5.3

Other Threatened Species Observation Locations

5.4.2 Results for BC Act Listed Ecosystem Credit Species

The ecosystem credit species were observed within the Development Footprint are described in **Table 5.10**.

Table 5.10 Ecosystem Credit Species Observation Details

Common Name	Scientific Name	Observation Details
Glossy-black Cockatoo	<i>Calyptorhynchus lathami</i>	This species was heard calling to the south-west of the Development Footprint on 14 October 2021 and was observed in the north-eastern part of the Development Footprint in two locations on 31 January 2022. The observation locations are shown in Figure 5.3 . The behaviours observed were consistent with foraging and no use of the site for breeding habitat was observed despite targeted survey in the breeding season.
Diamond Firetail	<i>Stagonopleura guttata</i>	This species was observed within the Development Footprint at several locations as shown in Figure 5.3 . The observation dates were 24 August 2021, 23 November 2021, 2 February 2022 and 22 March 2022.
Dusky Woodswallow	<i>Artamus cyanopterus</i>	This species was seen within the Development Footprint on 26 August 2021 and 23 November 2021. The observation locations are shown in Figure 5.3 .
Little Lorikeet	<i>Glossopsitta pusilla</i>	The Little Lorikeet was observed foraging within the Development Footprint on 22 September 2021, 8 February 2022 and 22 March 2022. The observation locations are shown in Figure 5.3 .

5.4.3 Results for EPBC Act Listed Species

Details of the threatened species listed within the EPBC Act observed during surveys or mapped by important habitat are described in **Table 5.11**.

Table 5.11 Results for EPBC Act Listed Species Present (recorded within the Development Footprint)

Common Name	Scientific Name	Extent (ha) of Suitable Habitat Present On Site
Regent Honeyeater	<i>Anthochaera phrygia</i>	This species was not observed during surveys. This species is assessed by mapped important habitat which overlaps with the Development Footprint. The extent of mapped important habitat within the Development Footprint is 44.96 ha.
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Areas of suitable foraging habitat for this species is limited to scattered occurrences of <i>Allocasuarina</i> trees which are present within PCT 1661.
White-throated Needle-tail	<i>Hirundapus caudacutus</i>	This species was recorded during surveys on 23 November 2022 (8 individuals observed) and on 1 February 2022 (3 individuals observed). The entire area of the Development Footprint is considered to provide suitable aerial foraging habitat for this species.
Diamond Firetail	<i>Stagonopleura guttata</i>	The entire area of the Development Footprint, excluding water and cleared land and exotic vegetation is considered to provide suitable foraging habitat for this species.

5.5 SEPP (Biodiversity and Conservation) 2021

Chapters 3 and 4 of State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 (the SEPP) contain provisions for assessing impacts to Koalas for Local Council assessed development applications. This SEPP is not directly relevant to State Significant Development. Chapter 3 of the SEPP has been considered below in the identification of potential Koala habitat and breeding habitat to support further assessment under State and Commonwealth legislation.

For RU1 Primary Production zoned land, Chapter 3 Koala Habitat Protection 2020 of the SEPP describes:

- Potential habitat as areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
- Core Koala habitat as area of land with a resident population of Koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.

This assessment of Koala habitat has used the Koala feed tree schedule itemised in both Schedule 1 and Schedule 3 of SEPP (Biodiversity and Conservation) 2021 as the latter provides a comprehensive list of preferred feed trees based on recent studies (OEH 2018a).

Three of the tree species listed in Schedule 3 of the SEPP have been recorded within the Project Area. These tree species represent 15% or greater of the total number of trees within any PCT in the Subject Land and, as such, all PCTs across the Subject Land represent potential Koala habitat. **Table 5.12** lists the Koala feed trees present within the Development Footprint.

Table 5.12 Koala Feed Tree Present within Project Area

Scientific Name	Common Name
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Eucalyptus albens</i> *	White Box
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box

Despite the Development Footprint containing potential habitat for the Koala, the Koala was not recorded in the Project Area despite extensive ecological surveys. In addition, a review of the BioNet Atlas of NSW Wildlife reveals three records of this species within 5 km of the Project Area (including one from within the Project Area dated 1957), with six records within 20 km of the Subject Land. These records range from 1957 to 2016.

As a result, the Subject Land does not represent core Koala habitat as the Koala was not recorded in the Project Area and very few Koalas have been recorded within 5 km within the last 18 years. No further provisions of Koala habitat protection in SEPP (Biodiversity and Conservation) 2021 apply. Notwithstanding this, the Koala is a species credit species under the BAM and has been further considered as part of this BDAR.

6.0 Identifying Prescribed Impacts

Prescribed impacts which are predicted to occur as a result of the proposed development are documented in **Table 6.1**.

Table 6.1 Prescribed Impacts Identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No	<p>There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the Development Footprint.</p> <p>There are areas of rock piles, minor rock outcropping and shallow sandstone that will be impacted by the Project.</p>	Based on the results of the surveys completed it is considered that there will be no known threatened entities using the features identified.
Human-made structures	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	<p>There is an occupied residential dwelling and farm sheds within the Development Footprint proposed for removal.</p> <p>There is also a disused 1900s house in the north-eastern part of the Development Footprint.</p>	No threatened entities were observed using or are likely to use any man-made structures that will be removed or modified by the Project.
Non-native vegetation	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	The non-native vegetation has been attributed to Category 1 land. This consists of land used primarily for agriculture and has poor value for threatened species.	No threatened entities were observed using or are likely to use any non-native vegetation that will be removed or modified by the Project.
Habitat connectivity	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	There will be clearing of native vegetation including canopy trees, these are mainly isolated and scattered trees, areas of derived native grassland and highly disturbed agricultural land assessed as Category 1 Land. The Project includes corridors between the four distinct Project areas.	<p>The threatened entities observed during surveys are highly mobile species, capable of flying over the areas proposed for development. It is likely that these species will also utilise the retained areas of connectivity between the four Project areas. These species include:</p> <ul style="list-style-type: none"> • Barking Owl. • Diamond Firetail. • Dusky Woodswallow. • Glossy Black-Cockatoo. • Little Lorikeet. • White-throated Needle-tail.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Waterbodies, water quality and hydrological processes	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	Ten farm dams are proposed for removal. First and second order watercourses will also be impacted. Aquatic impacts are addressed in the Aquatic Assessment prepared by Coast Ecology (2023).	No threatened entities were observed using aquatic areas.
Wind turbine strikes (wind farm development only)	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No	This assessment is not a wind farm development.	Not applicable
Vehicle strikes	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	Vehicle movements would be on tracks throughout the Development Footprint and would utilise existing tracks where possible.	No threatened entities are likely to be affected by vehicle strikes as vehicle movements will be at low speed.

7.0 Avoid and Minimise Impacts

7.1 Avoid and Minimise Direct and Indirect Impacts

7.1.1 Project Location

7.1.1.1 Location of Surface Works in Areas with No or Low Biodiversity Values

The entire extent of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project and subject to initial surveys. The Project Area (2000 ha) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Since the early planning stages, the Proponent has sought to balance the areas of biodiversity impacts proposed with achieving retention of areas for a future Biodiversity Stewardship Agreement (BSA) to provide offsets for the Project. The Project has been designed to take advantage of the most disturbed parts of the Development Footprint and is centred on the areas of Category 1 – Exempt Land, areas of degraded derived native grassland which have been subject to historical clearing and are currently managed for livestock grazing. The areas of intact forest and woodland present were avoided during the refinement of the Development Footprint in the planning process. Development Footprint alterations have resulted in biodiversity impact avoidance through an initial-avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further approximately 10% reduction in Development Footprint (882 ha to 799.5 ha). This has included the following targeted measures:

- Redesign the Project to minimise impacts on areas of mapped Regent Honeyeater important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to reduce impacts to suitable breeding habitat for the Barking Owl.
- Alteration of the Project to avoid impact to PCTs associated with habitat for the Large-eared Pied bat and the Eastern Cave Bat.
- Reduction in the impacts to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC to avoid areas of woodland with intact crown condition, and resulting in impact minimisation to areas to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area, and the remains of a Slab Hut of historic heritage importance.

7.1.1.2 Location of Sub-Surface Works in Areas with No or Low Biodiversity Values

Underground cabling will be required to connect infrastructure to the substation which is located in the south-eastern section of the central Project area. The underground cabling has been located within the footprints of the access roads and areas with low biodiversity values.

7.1.1.3 Avoidance of Wildlife Corridors

The Development Footprint contains agricultural land, predominantly comprised of grazed grasslands with remnant trees. It is surrounded by the Goulburn River National Park. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats.

The Development Footprint contains three polygons which are separated by proposed vehicle access tracks, as shown in **Figure 3.2**. The three polygons which form the Development Footprint will be protected with fauna exclusion fencing, however the vehicle tracks will not be fenced to avoid habitat fragmentation and ensure that connectivity for terrestrial fauna species is maintained through the Project Area.

7.1.1.4 Location of Works to Minimise Interactions with Threatened Entities

Reductions in the Development Footprint assessed by Umwelt are shown in **Figure 7.1** and have included design considerations to minimise impacts to breeding habitat for the Barking Owl, mapped Important Habitat for the Regent Honeyeater and the higher quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC associated with PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley.

7.1.1.5 Location of Works to Avoid Impacts on Waterbodies and Hydrological Processes

Watercourse impacts will be limited to ephemeral first and second order streams. The main drainage trunk and the third order section of Redlynch Creek will be retained via an exclusion zone with impacts limited to designated crossing points.

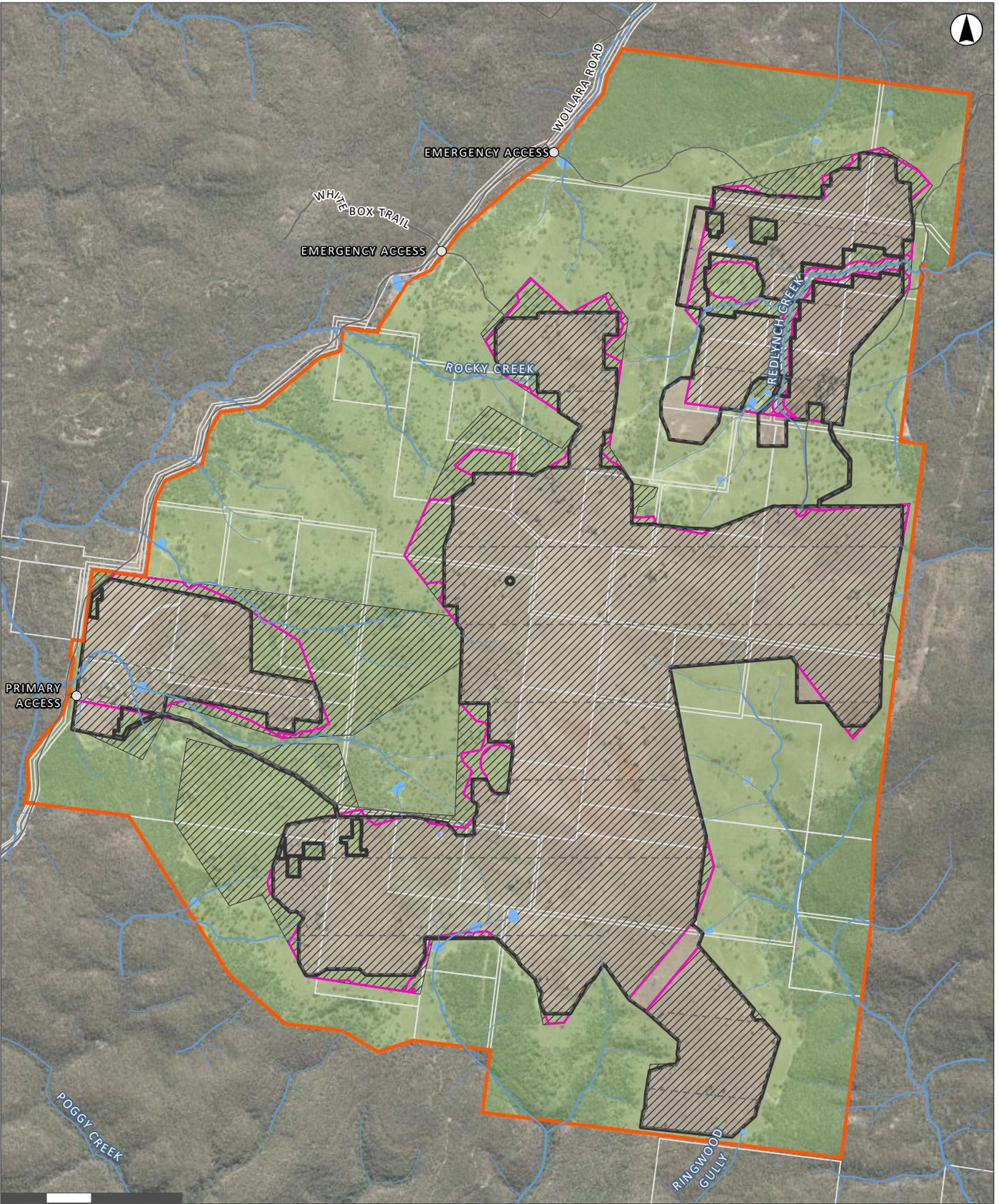
7.1.1.6 Alternative Routes Considered

The Project has been designed to make use of the existing access tracks present throughout the site. It is considered that the use of other routes will not result in further impact minimisation or avoidance.



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- Legend**
- Access Points
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Waterbodies
 - Property Boundaries
 - Project Area
 - Final Development Footprint (2023)
 - Development Footprint (2022)
 - Initial Development Footprint
 - Investigated
 - Impact Avoidance Areas

FIGURE 7.1

Impact Avoidance and Minimisation Locations

7.1.1.7 Alternative Sites Within the Subject Land Considered

The entire extent of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project, and subject to initial surveys. Areas of intact vegetation were avoided early in the planning process to minimise impacts to the areas with the highest biodiversity values including large areas of mapped Important Habitat for the Regent Honeyeater and the highest quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community.

Impact avoidance focused the Development Footprint on the previously cleared areas of historically disturbed vegetation, particularly areas with a long history of agricultural use mapped as Category 1 Exempt Land.

7.1.2 Project Design and Planning

7.1.2.1 Alterations to the Project Footprint

Several Project refinements have been incorporated into the design and layout of the Project since the preparation of the initial Scoping Report and the completion of biodiversity surveys, to avoid and/or minimise impacts to sensitive environmental features. These refinements have been implemented as an outcome of ongoing consultation with landholders, refining the engineering design and targeted ecological surveys conducted across the Project Area. This has resulted in several iterations to the Development Footprint to achieve the current design, shown in **Figure 7.1**.

Development Footprint alterations have resulted in biodiversity impact avoidance through an initial avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further approximately 10% reduction in Development Footprint (882 ha to 799.5 ha). These alterations and refinements targeted the retention of:

- All areas of moderate to good condition White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.
- All areas of the VEC Hunter Valley Footslopes Slaty Gum Woodland.
- Much of the mapped Regent Honeyeater Important Habitat within the Development Footprint.
- All suitable Barking Owl breeding trees where activity was detected during surveys.
- PCTs associated with the threatened microbat species Large-eared Pied Bat and Eastern Cave Bat.
- The third order sections of Redlynch Creek.

7.1.2.2 Design Measures

The Project has been designed to take advantage of an existing 500 kV transmission line crossing the south-east portion of the site, allowing easy connection to the national electricity grid and avoiding the requirement for additional clearing for transmission lines.

7.1.2.3 Location of Ancillary Structures and Sheds in Areas with No Biodiversity Values, or in Areas of Poorest Habitat

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures and sheds such as site facilities, storage areas and materials stockpiles.

7.1.2.4 Location of Ancillary Structures and Sheds to Avoid Habitat of Threatened Entities

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures such as site facilities, storage areas and materials stockpiles. Threatened species habitat will not be separately impacted by the location of ancillary structures.

7.1.2.5 Actions that Provide for Ecological Rehabilitation, Restoration and/or Maintenance or Retained Areas

The residual parts of the Project Area are currently being investigated for the establishment of a BSA to generate biodiversity credits to offset the impacts associated with the Project. The establishment of a BSA would provide offsets in the same locality as the Project and provide an opportunity for the rehabilitation, restoration and maintenance of the residual site areas. Specific objectives would include tree planting in areas of derived native grassland associated with the White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC and monitoring, rehabilitation and protection of areas of mapped important habitat for the Regent Honeyeater.

7.1.2.6 Alternative Modes or Technologies Considered

The proponent considered the possibility of establishing a wind farm on the Development Footprint in lieu of a solar farm. Discussions with the proponent identified that a wind farm may have a reduced direct impact footprint, however, would likely result in increased indirect impacts to birds and bats through turbine strikes and barotrauma events. This would potentially have a higher level of impact on the Regent Honeyeater and higher visual impacts within the surrounding Goulburn River National Park.

Alternative Project layouts based on different solar farm designs using mature technology with a proven track record of large-scale implementation, have also been investigated including:

- Fixed versus tracking options for PV module mounting: A single-axis tracking system was chosen for the Project as it allows for more efficient electricity generation than fixed tilt options, leading to more efficient land use. Tracking systems also have a lower visual impact as they minimise glare from the sun, which can occur when the sun is at low angles in the sky and the PV modules are not facing the sun.
- Mono-facial versus bifacial PV modules: Bifacial PV modules were selected for the Project as they allow for more efficient electricity generation than traditional single-sided PV modules, leading to more efficient land use. The distance between the rows of modules is also larger for bifacial modules, which helps to minimise environmental and visual impacts of the Project and facilitate grazing.

- Selection of higher rated capacity solar panels has also been adopted to ensure that the Development Footprint is minimised, the Project obtains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the projects economic viability.

7.1.2.7 Project Design Constraints

The Project Area was selected for the location of a solar farm due to the presence of an existing 500 kV transmission line, which means that there will be no requirement for a new electricity transmission line or associated impacts. To ensure that the project remains economically viable the total capacity of solar production needs to remain at or above a 550 MWp of solar electricity.

The Project Area is also characterised by suitable terrain and topography, high quality solar irradiance and ideal climatic conditions and access to major transport networks for delivery of construction materials. There is only one surrounding land holder (the NSW Government) and the visual impacts associated with the Project are minimised by the existing screening provided by the Goulburn River National Park.

7.2 Avoid and Minimise Prescribed Impacts

Prescribed Impacts are additional impacts which require assessment; however, they are not impacts which require consideration when calculating the number and classes of biodiversity credits required. Clause 6.1 of the Biodiversity Conservation Regulation defines *Prescribed Impacts* as:

- the impacts of development on the following habitat of threatened species or ecological communities:
 - karst, caves, crevices, cliffs and other geological features of significance,
 - rocks,
 - human made structures,
 - non-native vegetation,
 - the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,
 - the impacts of development on movement of threatened species that maintains their lifecycle,
 - the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),
 - the impacts of wind turbine strikes on protected animals,
 - the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

7.2.1 Project Location

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** of this Report and comprise disturbances to non-native vegetation, human made structures and waterbodies such as dams and watercourses. Areas of non-native vegetation, excluded areas and human made structures are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the Project location.

7.2.2 Project Design

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** of this Report and comprise disturbances to non-native vegetation, human made structures and waterbodies such as dams and watercourses. Areas of non-native vegetation, excluded areas and human made structures are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the Project design.

7.3 Other Measures Considered

7.3.1 Do Nothing Option

The 'Do nothing' option was considered as part of environmental impact assessment for this Project. The Project Area is currently used for livestock grazing. The 'do nothing option' would allow for the continued use of the Project Area solely for agricultural purposes. The 'do nothing option' would also imply that the Project is not developed and would therefore forego the Project's identified benefits, namely:

- the provision of additional renewable energy supply to assist in reaching state and Commonwealth renewable energy targets in areas of the network that can handle large scale solar without the need for new network upgrades or powerlines such as Renewable Energy Zones
- assistance in the transition towards cleaner electricity generation and a reduction in greenhouse gas emissions
- increased energy security and supply into the Australian grid
- significant social and economic benefits created through capital investment, provision of direct and indirect employment opportunities during the construction and operation of the Project and community benefit scheme.

The adverse impacts associated with the Project are considered to be manageable through the implementation of the impact avoidance, minimisation and offsetting measures proposed. Considering the benefits of the Project, the 'do nothing option' is considered to not be a preferred option for the Proponent.

7.4 Summary of Measures to Avoid and Minimise Impacts

A summary of the measures proposed to avoid and minimise direct, indirect and prescribed impacts associated with the Project is provided in **Table 7.1**.

Table 7.1 Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts

Action	Outcome	Timing	Responsibility
Preliminary biodiversity constraints analysis	Preliminary assessment of biodiversity constraints to inform Project design and minimise impacts to areas with high biodiversity values	Project design	Project Ecologist, Planning Team and Proponent
Location and design of works in existing disturbed areas where possible	Focus impacts on areas of low biodiversity value	Project design	Project Ecologist, Planning Team and Proponent
Reduction of Development Footprint boundary / impact footprint	Avoidance and minimisation of impacts to mapped important habitat for the Regent Honeyeater, areas associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community and Barking Owl Breeding Habitat.	Project design	Proponent
Workforce education and training	Environmental awareness for workforce	Pre-construction and during construction and operation	Engineering procurement and construction contractor (EPC)
Implement Construction Environmental Management Plan (CEMP)	Management and minimisation of potential environmental impacts	Project construction	EPC Contractor
Implementation of vegetation protection zones for areas to be retained	Protect retained habitats	During construction phase	Project Ecologist and EPC Contractor
Ecologist pre-clearance surveys and supervision of works	Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm	Construction / site clearing phase	Project Ecologist and EPC Contractor
Fencing and access control	Avoidance of unplanned human and livestock interference and disturbance to retained areas	Construction and operational phases	EPC Contractor
Erosion and sedimentation control	Minimise erosion and sedimentation within the site and downstream habitats through installation and maintenance of erosion and sediment controls	Construction and operational phases	EPC Contractor

Action	Outcome	Timing	Responsibility
Weed management	Prevent weed incursions and spread	During construction, site clearing and operational phases	EPC Contractor
Fauna exclusion	Prevent entrapment of fauna within site infrastructure	Operational phase	EPC Contractor and Project ecologist

8.0 Impact Assessment

8.1 Direct Impacts

8.1.1 Residual Direct Impacts

The parts of the Development Footprint which are subject to impacts associated with the Project are mapped in **Figure 8.1**. **Table 8.1** summarises the extent of proposed residual direct impacts to plant community types and threatened entities observed or assumed to be present on the Development Footprint.

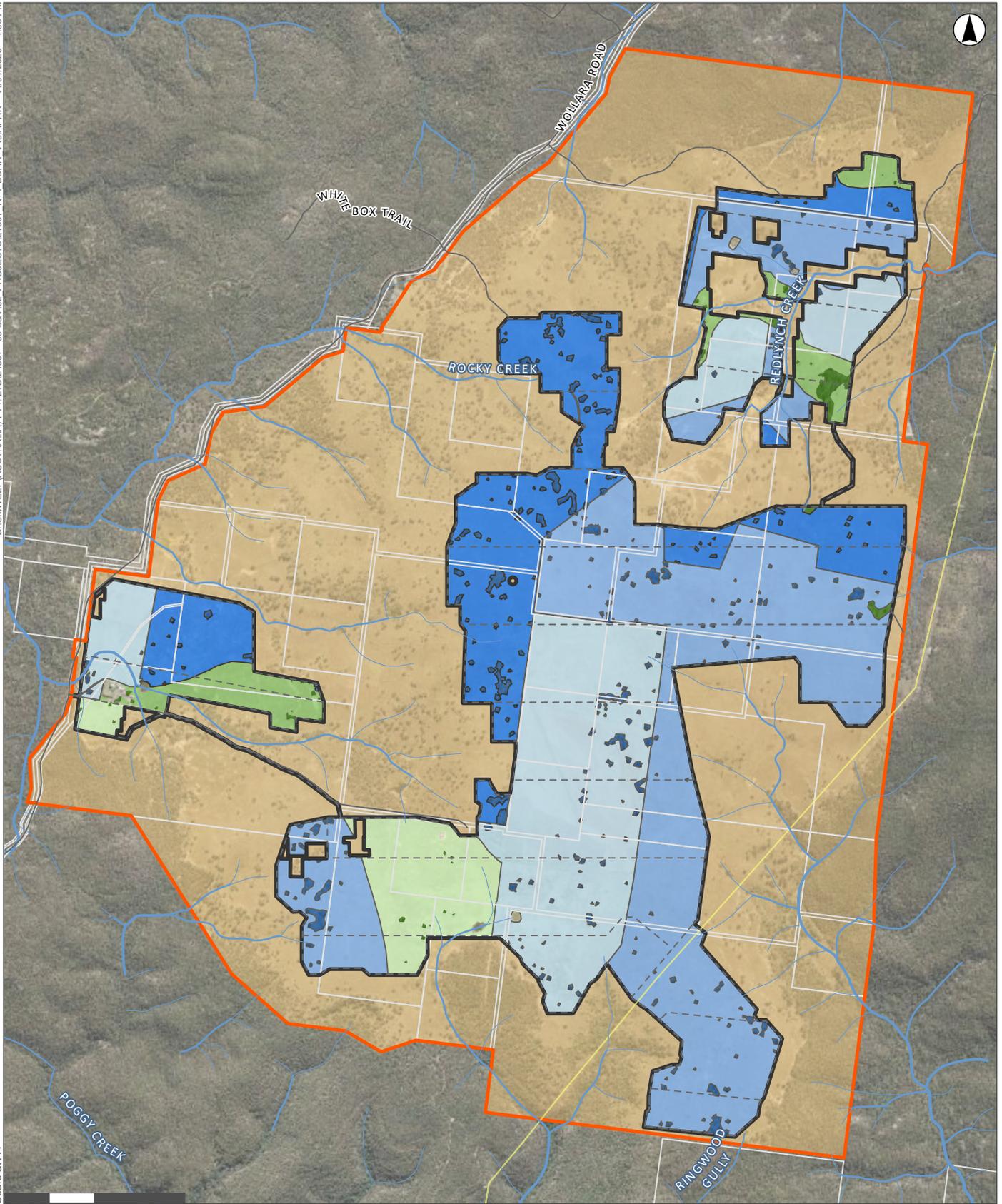
Table 8.1 Summary of Residual Direct Impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act Status	EPBC Act Status	Potential SAIL Entity	Project Phase/ Timing of Impact	Extent
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands	Critically Endangered Ecological Community	Critically Endangered Ecological Community	Yes	Construction phase	Derived native grassland component = 675.99 ha Scattered Trees component = 23.64 ha Total extent = 699.63 ha
Regent Honeyeater Mapped Important Habitat	Critically Endangered	Critically Endangered	Yes	Construction phase	Scattered Trees = 20.93 ha Derived Native Grassland = 24.03 ha Total extent = 44.96 ha
Barking Owl Breeding Habitat	Vulnerable	Not listed	No	Not applicable	Total / Derived Native Grassland = 1.21 ha



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GDA 1994 MGA Zone 56

- Legend**
- Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Electricity Transmission Line
 - Property Boundaries
 - Development Footprint
 - Project Area
 - Impact Avoidance Areas

Plant Community Types and Condition Zones

PCT 483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

- Low Condition Derived Native Grassland
- Moderate to Low Condition Derived Native Grassland
- Moderate Condition Derived Native Grassland
- Scattered Trees

PCT 1661 - Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

- Low Condition Derived Native Grassland
- Moderate to Low Condition Derived Native Grassland
- Scattered Trees

FIGURE 8.1

Final Impacts likely to occur on the Subject Land

8.1.2 Change in Vegetation Integrity Score

For each vegetation zone the change in vegetation integrity is based on the development impacting to zero during construction. No vegetation integrity scores have been assessed as above zero after development and there would be no management actions required to maintain any remaining vegetation as it has been assumed that impact will occur to all vegetation within the vegetation zones. While this assessment is based on impacting vegetation integrity scores to zero, it is expected that the actual vegetation integrity score will not decrease to zero due to the retention of grassland areas under the solar panels and within the edges of the Development Footprint.

Table 8.2 Impacts to Vegetation Integrity

PCT and Vegetation Condition Zone	Management zone	Area (ha)	Before development				After development				Change in VI score
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
PCT 483 Condition Zone 1 – Scattered Trees	Development Footprint	23.64	80.2	85.1	69.6	78	0	0	0	0	-78
PCT 483 Condition Zone 2 - Moderate Condition Derived Native Grassland	Development Footprint	168.48	58.1	67.5	9.3	33.1	0	0	0	0	-33.1
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	Development Footprint	308.37	61.5	65.5	0.5	12.4	0	0	0	0	-12.4
PCT 483 Condition Zone 4 - Low Condition Derived Native Grassland	Development Footprint	199.14	37.5	36	0.7	9.9	0	0	0	0	-9.9
PCT 1661 Condition Zone 1 – Scattered Trees	Development Footprint	6.07	59.5	27.6	81	51.1	0	0	0	0	-51.1
PCT 1661 Condition Zone 2 - Moderate to Low Condition Derived Native Grassland	Development Footprint	36.79	40.6	17.1	3.3	13.2	0	0	0	0	-13.2

PCT and Vegetation Condition Zone	Management zone	Area (ha)	Before development				After development				Change in VI score
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
PCT 1661 Condition Zone 3 - Low Condition Derived Native Grassland	Development Footprint	53.24	32.3	16.1	0.1	3.3	0	0	0	0	-3.3

8.2 Indirect Impacts

Table 8.3 summarises the extent of the proposed residual indirect impacts to plant community types and threatened entities observed or assumed to be present on the Development Footprint.

Table 8.3 Summary of Residual Indirect Impacts

Indirect impact	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
Increased site occupation	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	High	Frequent / Ongoing	Construction and operation	Likely to occur, consequences are likely to include reduction in habitat suitability for threatened fauna
Connectivity and corridors	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Frequent / Ongoing	Operation	A reduction in wildlife connectivity will occur, however some connectivity will be retained through planned corridor areas.
Light spill impacts	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Frequent / Ongoing	Operation	Limited impacts may occur, consequences likely to include minor alteration to fauna behaviours including avoidance of light and opportunistic utilisation of light spill areas.

Indirect impact	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase/ timing of impact	Likelihood and consequences
Noise impacts	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Frequent / short term	Construction	Construction noise will occur, consequences may include short term reduction in suitability of retained and adjoining habitats during construction works for sensitive fauna species.
Air quality impacts	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Infrequent / short term	Construction	Low potential to occur if appropriate dust suppression is undertaken. Consequences include physical injury to airways of fauna species and short term reduced photosynthetic capacity for impacted flora.
Water impacts	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Infrequent / long term	Construction and operation	Likely to occur. Consequences include loss of existing ephemeral watercourses within the Development Footprint.
Weed invasion	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Frequent / long term	Construction and operation	High potential to occur, although existing site use has resulted in widespread weed invasion. Consequences include introductions of new weeds and reduced grazing and suppression of existing weeds.
Pest animal species	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Low	Frequent / long term	Construction and operation	Likely already occurring due to historical habitat modification. Low potential for increased impacts, potential consequences include reduced habitat suitability and predation of threatened fauna species.
Security fencing	Ecosystem credit species retained for assessment in Table 5.1 and species credit threatened fauna species assessed as present in Table 5.5 .	Moderate	Frequent / Long term	Construction and operation	Likely to occur. Consequences include reduction in habitat connectivity.

8.3 Prescribed Impacts

Prescribed impacts associated with the Project are identified in **Section 6.0** of this report and are further documented below.

8.3.1 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

8.3.1.1 Nature and Extent

The Project is not likely to impact caves, crevices, cliffs or geological features of significance.

Impacts are likely to occur to minor areas of rock outcropping which do not contain habitat structure for threatened bat species, shallow exposed rock and areas of piled rock which has been removed from paddocks. These impacts are likely to be long-term and permanent. Relocation of rock piles will occur to minimise potential impacts.

8.3.1.2 Duration

This is likely to be one-off, permanent impact for the life of the Project which will occur during construction.

8.3.1.3 Consequences

No threatened species have been recorded utilising these habitats and no significant consequences are predicted to occur.

8.3.2 Human Made Structures

8.3.2.1 Nature and Extent

The post-war sheds house and ancillary structures and sheds will be repurposed for the construction compound and the disused 1900s house will be removed.

8.3.2.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction.

8.3.2.3 Consequences

No threatened species have been observed utilising these structures and no significant consequences are predicted to occur.

8.3.3 Non-Native Vegetation

8.3.3.1 Nature and Extent

Minor areas of non-native vegetation occur around the existing dwelling and will be removed by the Project. Extensive areas of non-native vegetation are present within the areas assessed as Category 1 Exempt Land.

8.3.3.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site clearing.

8.3.3.3 Consequences

No threatened species have been observed utilising these habitats and no significant consequences are predicted to occur.

8.3.4 Excluded Areas – Category 1 Exempt Land

8.3.4.1 Nature and Extent

The areas of Category 1 Exempt Land mapped within the Development Footprint are identified in **Figure 1.5**. PCT Mapping and BAM Plot surveys have been undertaken to assess areas of Category 1 Exempt Land. The Project will result in long-term permanent removal of these areas, although it is possible that grass-dominated areas in a similar condition state will persist in these areas under the proposed solar panels.

8.3.4.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site clearing.

8.3.4.3 Consequences

This impact will reduce the extent of suitable habitat available to threatened species which are capable of utilising highly disturbed terrestrial agricultural environments. This impact may also modify or reduce the suitability of aerial habitats for threatened species which forage during flight such as birds and bats.

These areas contain highly disturbed non-woody vegetation utilised for agricultural purposes including cattle grazing.

8.3.5 Habitat Connectivity

8.3.5.1 Nature and Extent

The Project has potential to affect habitat connectivity for flora and fauna species. The areas of clearing primarily consist of native vegetation composed of scattered canopy trees and areas of derived native grassland composed of highly disturbed agricultural land. The Project includes corridors between the Development Footprint areas which will not be fenced, to enable the persistence of habitat connectivity through the site.

8.3.5.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.3.5.3 Consequences

The consequences include reduced wildlife connectivity, however all areas likely to be important for habitat connectivity for woodland species have been maintained. The Project is unlikely to have any substantive impacts to connectivity as the Development Footprint is already substantially degraded by clearing, tree thinning and agricultural management, such that species utilising these areas for connectivity are already highly mobile and disturbance tolerant. Due to the nature and layout of the site, which is surrounded by undeveloped land, there will be no overall changes to landscape connectivity for wildlife movement.

8.3.6 Waterbodies, Water Quality and Hydrological Processes

8.3.6.1 Nature and Extent

The ephemeral first and second order watercourses present within the Development Footprint will be impacted by the Project. Several small farm dams will also be filled to facilitate the Project. The third order section of Redlynch Creek will be retained.

8.3.6.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.3.6.3 Consequences

The impacts associated with waterbodies and watercourses include reduced availability of habitat for aquatic species, altered hydrology and increased erosion and sedimentation within the Development Footprint. Suitable environmental controls will be implemented to prevent impacts to downstream environments within the Goulburn River National Park.

8.3.7 Vehicle Strikes

8.3.7.1 Nature and Extent

The Project includes the construction of several access roads through the site which will be utilised in the day-to-day operation of the Solar Farm. Vehicles driven through the site will adhere to appropriate speed limits to minimise impacts associated with vehicle strikes.

8.3.7.2 Duration

There will be an ongoing potential, however low probability of this impact occurring for the life of the Project.

8.3.7.3 Consequences

There is no reasonable probability that threatened entities will be impacted by vehicle strikes as vehicle movements will be at low speed.

8.4 Mitigating Residual Impacts – Management Measures and Implementation

The following management measures are proposed to mitigate the residual impacts (direct, indirect and prescribed) associated with the Project. The impact mitigation measures proposed for residual impacts are also further summarised in **Table 8.4**, with implementation details provided in **Table 8.5**.

8.4.1 Workforce Education and Training

The development of education packages and training can help to mitigate anthropogenic impacts on biodiversity resulting from the construction and operation of the Project. The ability of non-ecological personnel to identify key threatened species or key ecological threats can help to mitigate impacts on threatened species. The following mitigation actions will be implemented for the Project to develop a greater understanding and awareness of biodiversity issues in non-ecological trained personnel:

- Inductions for the workforce will be undertaken to make them aware of the key ecological issues present in the Development Footprint to aid in their understanding of their role and responsibilities in the protection and/or minimisation of impacts to all native biodiversity.
- Inductions will identify the location of sensitive flora and fauna, including any defined exclusion / no-go areas, and the policies being implemented to protect the biodiversity values of such areas.
- Responsibilities with respect to weed management and biosecurity.

8.4.2 Implementation of Vegetation Protection Zones for Areas to be Retained

During construction, temporary exclusion fencing or other form of suitable marking measure, will be used to demarcate vegetation in locations where necessary to avoid accidental damage to areas of vegetation outside of the Development Footprint. Access control is an important feature in protecting and demarcating areas outside the Development Footprint from vehicle access, human access, and accidental disturbance. Proposed measures include:

- appropriate temporary fencing (or other form of suitable marking measures) and signposting of areas to prevent the uncontrolled entry of people, accidental disturbance and to minimise vehicular and human traffic
- clear and visible signage is to be appropriately located to inform the workforce and others of the restricted access or otherwise of areas outside the Development Footprint
- worker education and awareness of exclusion areas, including as delivered through site induction information
- the use of GPS enabled machinery (where available) to help prevent accidental disturbance of exclusion areas.

8.4.3 Ecologist Pre-Clearance Surveys and Supervision of Works

Pre-clearance surveys and tree felling supervision will be undertaken by an appropriately qualified and experienced ecologist to minimise potential impacts to fauna species, particularly hollow-dependent fauna. A detailed tree-felling supervision protocol is to be developed and documented as part of the CEMP for the Project. Rock piles within the site should also be retained and relocated to development exclusion zones during pre-clearance surveys to avoid burial.

8.4.4 Erosion and Sedimentation Control

A Stormwater Management Plan including an Erosion Sediment Control Plan (ESCP) will be prepared to appropriately limit post development flows and manage downstream water quality as part of the site establishment and clearing works. Measures to be implemented include:

- Minimising the area of disturbance (as far as practicable).
- Diverting run-off water around disturbed areas.
- Installation and ongoing maintenance of temporary erosion and sediment controls (e.g., sediment fencing) throughout the duration of the construction of the Project.
- Design, implementation, and ongoing maintenance of permanent operational phase controls (e.g. catch drains) during the operational phase of the Project.
- Stabilisation (i.e., landscaping and revegetation) of all disturbed areas not required for the operation of the Project, to reduce the potential for future erosion.
- The ESCP will be drafted with regard to the Managing Urban Stormwater: Soils and Construction (Volume 1) standard or to the standard of any equivalent replacement to this standard available at the commencement of construction.

8.4.5 Weed Management

Weed species could be inadvertently brought into the Development Footprint or surrounding habitats with imported materials, on vehicles and mobile plant, or could invade naturally through removal of native vegetation and the creation of a suitable growth medium. The presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species.

Weed management controls will include:

- The survey and treatment of invasive weed species prior to the disturbance of topsoil within the Development Footprint to prevent an outbreak and / or the spread of species to previously unaffected areas within the Development Footprint.
- Ongoing environmental inspections and treatment of outbreaks of invasive weed species as required within the Development Footprint during the construction and operation of the Project.
- All machinery and equipment will be cleaned thoroughly prior to entering the Development Footprint. Cleaning must include the removal of all mud and plant matter (inside and out), followed by washing with high pressure water.

8.4.6 Fencing, Access Control and Fauna Exclusion

To avoid native fauna (non-avian) becoming trapped within the solar farm, a security fence will be constructed to deter fauna from occupying and becoming entrapped within the site infrastructure. This fencing will occur across the three separate Development Footprint polygons.

8.4.7 Preparation and Implement of Construction Environmental Management Plan

A CEMP will be prepared to document the environmental impact mitigation, performance targets and monitoring requirements for the construction and operational phases of the Project.

Table 8.4 Summary of Proposed Mitigation and Management Measures for Residual Impacts (Direct, Indirect, and Prescribed)

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely Efficacy
Workforce education and training	Environmental awareness for construction and operational site workers	Construction and operation	For all new contractors and employees as part of the general site induction	EPC Contractor	Measure is likely to achieve intended outcome
Implementation of vegetation protection zones for areas to be retained	Temporary delineation of the Development Footprint impact footprint until permanent fencing is installed.	Construction / site clearing	Prior to and during site clearing and construction Permanent fencing to remain for the life of the development	EPC Contractor and Project Ecologist	Measure is likely to achieve intended outcome
Ecologist pre-clearance surveys and supervision of works	<ul style="list-style-type: none"> Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm. Relocation of rock piles. Dam de-watering. 	Construction / site clearing	Prior to and during site clearing	EPC Contractor and Project Ecologist	Measure is likely to achieve intended outcome
Erosion and sedimentation control	Installation and maintenance of appropriate erosion and sediment controls and work practices.	Prior to and during civil works until permanent controls such as sediment basins are installed and established.	Temporary erosion and sediment controls would be installed prior to commencement of construction and permanent measures such as stormwater detention basins would be maintained for the life of the development.	EPC Contractor	Measure is likely to achieve intended outcome
Weed management	Targeted spraying and/or grazing to suppress weed invasion	All stages of the development	As needed	EPC Contractor / Project Ecologist	Measure is likely to achieve intended outcome

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely Efficacy
Fencing, Access Control and Fauna exclusion	Installation of a permanent security fence of the three individual Development Footprint polygons	During operation	For the life of the development	EPC Contractor	Measure is likely to achieve intended outcome
Preparation and Implementation of CEMP	Develop plan to adequately manage: <ul style="list-style-type: none"> • environmental impacts during • construction including dam • dewatering controls, fencing and • access control, weed management • and erosion and sediment control. 	To prepared prior to the commencement of works and implemented for all construction works and for the life of the development as necessary	For the life of the development	Proponent / EPC Contractor	Measure is likely to achieve intended outcome

Implementation details for the proposed impact mitigation and management measures are provided in **Table 8.5**.

Table 8.5 Implementation Details for Proposed Impact Mitigation and Management Measures

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Workforce education and training	Completion and maintenance of a site induction register	Induction of all construction workers	Failure of EPC Contractor to induct workers	Breaches to be reported in accordance with notification procedures (7 days). Suspension of the relevant works until construction workers are inducted
Implementation of vegetation protection zones for areas to be retained	Monitoring to be undertaken by the Project Ecologist prior to commencement and monthly during construction works.	Protection of retained vegetation and habitats	Breach of vegetation protection zones / damaged to retained habitats	Breaches to be reported in accordance with notification procedures (7 days). Suspension of the relevant works until appropriate protection measures are implemented and appropriate remedial actions to remedy any adverse impacts are completed.
Ecologist pre-clearance surveys and supervision of works	Reporting on preclearance surveys and works supervision to be undertaken by Project Ecologist	Completion of proposed works	Completion of clearing works without Project ecologist supervision	Breaches to be reported in accordance with notification procedures (7 days). Ecologist must be present on site during pre-clearance surveys and works requiring ecological supervision.
Erosion and sedimentation control	Monitoring to be undertaken in accordance with requirements of CEMP.	Temporary erosion and sediment controls to be installed prior to works. Permanent controls to be maintained for the life of the development	Monitoring detects lack or failure of required temporary or permanent erosion and sediment controls.	Breaches to be reported in accordance with notification procedures (7 days). Erosion and sediment controls to be installed and/or improved.
Weed management	Monitoring to be undertaken in accordance with requirements of CEMP.	Weed growth to be continually suppressed within the Development Footprint area	Monitoring detects increasing weed infestations which are not being suppressed.	Alternative methods or herbicides to be used to achieve success.

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Fencing, Access Control and Fauna exclusion	Monitoring to be undertaken in accordance with requirements of CEMP.	Exclusion of all target fauna species.	Repair or upgrade to fencing.	Fencing design to be improved to achieve effectiveness.
Preparation and Implementation of CEMP	Implementation to be supervised by Project Ecologist or suitable environmental consultant with regular reporting to DPE during construction.	Completion of all proposed environmental protection works and monitoring inspections	Monitoring detects breach or failure to implement CEMP.	Breaches to be reported in accordance with notification procedures (7 days).

8.5 Adaptive Management Strategy for Uncertain Impacts (Where Relevant)

It is considered that the potential impacts associated with the Project are predictable and known. Adaptive strategies for impact mitigation measures are provided in **Table 8.5**. Further adaptive management strategies will be provided in the CEMP for the Project.

9.0 Serious and Irreversible Impacts

9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

The determination of a SAIL on biodiversity values is to be made by the decision maker in accordance with the principles set out in the BC Regulation 2017. Under Clause 6.7 (2) of the BC Regulation 2017, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of one of the following four principles:

- Principle 1: The impact will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Principle 2: the impact it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- Principle 3: it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- Principle 4: the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

SAIL on biodiversity values of proposed development or activity means SAIL on biodiversity values as determined under section 6.5 of the BC Act, that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development.

If the Minister for Planning is of the opinion that proposed SSD is likely to have SAIL on biodiversity values, the Minister is required to:

- take those impacts into consideration, and
- determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

A summary of the entities of relevance to this assessment which are listed as at risk of a SAIL is provided in **Table 9.1**.

Table 9.1 Entities at Risk of an SAI

Common Name	Scientific Name	Principle	Reason for Inclusion in Assessment
Regent Honeyeater	<i>Anthochaera phrygia</i>	1 & 2	Included in current list of entities at risk of an SAI and is likely to be impacted by the proposal
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.	-	1 & 2	Included in current list of entities at risk of an SAI and is likely to be impacted by the proposal

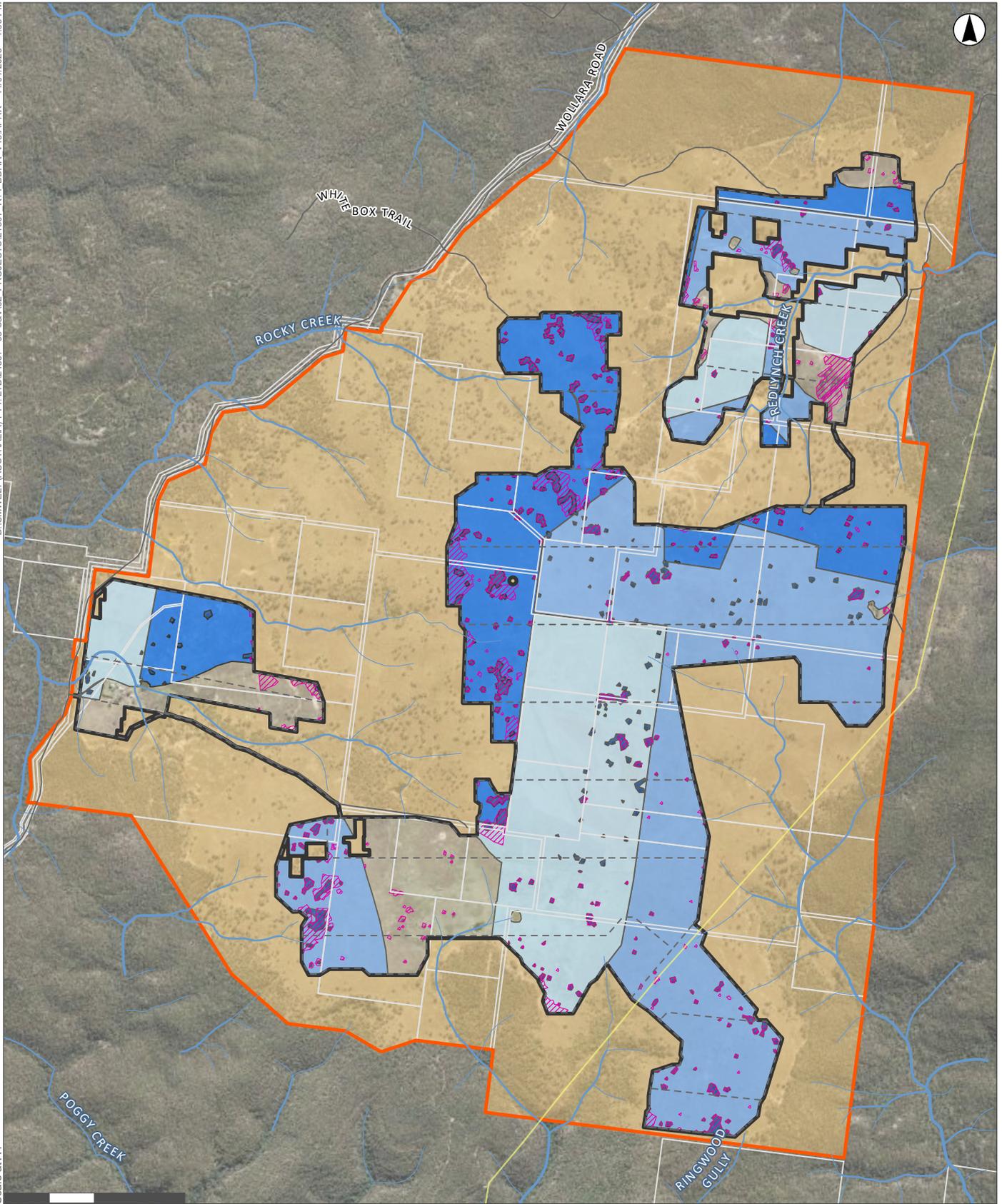
The locations of mapped important habitat for the Regent Honeyeater and the extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint are mapped in **Figure 9.1**.

The SAI additional impact assessment provisions (AIAPs) from the 2020 version of the BAM are addressed in **Section 9.1.1** of this report. These AIAPs were updated in the 2020 version of the BAM from the AIAPs provided in the 2017 version of the BAM which are also currently reproduced in Appendix B of the DPIE (2019) Guidance to assist a decision maker to determine serious and irreversible impacts.



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0 500 1,000 Meters

GDA 1994 MGA Zone 56

- Legend**
- Existing Roads and Tracks
 - - Proposed Access Tracks
 - Watercourse
 - Electricity Transmission Line
 - Property Boundaries
 - ▭ Development Footprint
 - ▭ Project Area

- Potential SAIL Entities**
- ▨ Regent Honeyeater Mapped Important Habitat
 - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland
 - ▭ Low Condition Derived Native Grassland
 - ▭ Moderate to Low Condition Derived Native Grassland
 - ▭ Moderate Condition Derived Native Grassland
 - ▭ Scattered Trees

FIGURE 9.1

Serious and Irreversible Impact Entities within the Development Footprint

9.1.1 Additional Impact Assessment Provisions for TECs at Risk of an SAI

9.1.1.1 White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions

The additional impact assessment provisions for TEC at risk of an SAI have been addressed for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in **Table 9.2**. The location of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint is shown in **Figure 9.1** and **Figure 9.2**. This ecological community is listed as critically endangered under the BC Act and the EPBC Act. The NSW Extent of this CEEC based on the NSW State Vegetation Type Mapping is shown in **Figure 9.3**.

Table 9.2 SAI Impact Assessment – Box White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

Response to BAM Section 9.1.1 Criteria
<p>1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAI (or reference to where these have been addressed in the relevant section of the BDAR).</p>
<p>The actions and measures proposed to avoid direct and indirect impacts are documented in Section 7.0 of this report.</p>
<p>2. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including:</p> <p>a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)</p> <p>b. The extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:</p> <ul style="list-style-type: none"> vi. Change in community structure vii. Change in species composition viii. Disruption of ecological processes ix. Invasion and establishment of exotic species x. Degradation of habitat

Response to BAM Section 9.1.1 Criteria

xi. Fragmentation of habitat

c. Evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:

- i. extent of occurrence
- ii. area of occupancy
- iii. number of threat defined locations.

d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).

The TBDC has been reviewed in relation to the information available for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Additional sources relied upon are referenced within the text below.

a. The current extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC.

Threatened Species Scientific Committee

An assessment completed by Threatened Species Scientific Committee (TSSC) (2006) and reproduced by Tozer and Simpson (2020) estimate that the pre-1750 area of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC was 3,717,366 ha, which has been reduced to a current extent in 2020 of just 250,729 ha. This represents a 93% reduction since 1750.

State Vegetation Type Map

Umwelt has utilised the current available State Vegetation Type Mapping (SVTM) which identifies an estimate of the pre-1750 and current extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland using the best currently available mapping. The SVTM pre-1750 area of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is between 1,895,058 ha and 2,403,693 ha and the current SVTM extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is between 1,267,603 ha and 1,639,571 ha. The variance in the SVTM upper estimate is due to some mapped PCTs being identified as only partly being associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Based on the SVTM there has been a 33.1–31.75% reduction in White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland since 1750.

Annual Loss and Reduction in Extent Since 1970

Tozer and Simpson (2020) have identified that the loss of the woodland component of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC between 2009 and 2019 was 6653 ha or 665.3 ha per annum distributed disproportionately between years.

Response to BAM Section 9.1.1 Criteria

Using an annual loss rate of 665.3 ha, an estimate of the loss over the 1970 to 2020 period of 33,265 ha of the woodland component of the CEEC has been obtained. However, it is considered the rate of loss prior to 2009 is likely to have been much greater than 665.3 ha per annum due to a non-linear rate of clearing attributed to less legislative restrictions protecting White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland prior to its listing.

b. The following information has been obtained from the Conservation Assessment of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC prepared by Tozer and Simpson (2020).

Changes in community structure

In relation to community structure there are essentially no remaining areas that are fully intact and most of the remaining extent has lost its understory, been invaded by exotic species, lost entire suites of species or lost its structure in terms of the loss of tree, shrub and/or ground layers.

Changes in species composition

Species composition has been adversely affected by degradation and fragmentation which has caused the loss of suites of species such as understorey components or faunal components such as reptiles, mammals and/or woodland birds. The species lost are sometimes replaced by more common species such as aggressive noisy miners, exotic flora or monocultures of native grasses.

Disruption of ecological processes

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle of the habitat characteristics of its component species a very large disruption of biotic processes or interactions. The changes have been such that reestablishment of the ecological processes, species composition and community structure of the original ecological community is not likely to be possible, even with immediate positive human intervention.

Invasion and establishment of exotic species

Weeds have invaded most of the remaining areas of the original pre-1750 extent of this ecological community and result in continuing detrimental change. Extensive areas have experienced elevated soil nitrogen as a result of the application of chemical fertilisers, which is associated with the invasion of weeds and eventual conversion of native to exotic pasture.

Degradation of habitat

The ecological community continues to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the destruction of all elements of the ecological community, threatens it with extinction. Cumulatively, the disruption of biotic processes and interactions caused by the implementation of management for agricultural production is very severe and less than 10% of the original distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is likely to have avoided the long-term impacts of pastoralism.

Response to BAM Section 9.1.1 Criteria

Fragmentation of habitat

The community has been extensively cleared throughout its range and remnants are typically small, isolated, highly fragmented and occur in predominantly cleared landscapes and exhibit highly modified understoreys.

c. The extent of occurrence of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland throughout its entire range in Australia is identified by Tozer and Simpson (2020) as 702,800 km². The extent of occurrence within NSW is not identified in the TBDC or separately assessed by Tozer and Simpson (2020).

The current geographic extent of this CEEC across its range is estimated by Tozer and Simpson (2020) (reproduced from TSSC 2006) as 576,654 ha, which includes an area of occupancy of 250,729 ha within NSW. This estimate does not include the derived native grassland component of the ecological community.

It is also considered that the current extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland provided by Tozer and Simpson (2020) is an underestimate based on the current SVTM mapping which maps between 1,267,603 ha and 1,639,571 ha within NSW. The variance in the SVTM estimate is due to the upper limit including some PCTs which are described as only partly being associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

No threat defined locations are specifically identified in the TBDC profile. It is not likely that a single threatening event in a geographically or ecologically distinct area would rapidly affect all occurrences of this CEEC.

d. This principle (principle 4) is not applicable to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. The ecological community does respond to management, some successful management measures are outlined in the document titled 'A Guide to Managing Box Gum Grassy Woodlands' (Rawlings, Freudenberger and Carr 2010).

While not directly relevant to the Project the following management actions are also listed within the TBDC:

- Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant).
- Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat).
- Do not harvest firewood from remnants (this includes living or standing dead trees and fallen material).
- Leave fallen timber on the ground.
- Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species.
- Encourage regeneration by fencing remnants, controlling stock grazing and undertaking supplementary planting, if necessary.
- Undertake weed control (taking care to spray or dig out only target species).

Response to BAM Section 9.1.1 Criteria

- Protect all sites from further clearing and disturbance.
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as steppingstones for fauna, and flora (pollen and seed dispersal).
- Mark remnants onto maps (of the farm, shire, region, etc) and use to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work). On-site markers can alert maintenance staff to the presence of a threatened species.

3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR.

The NSW White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.

4. The following questions are addressed in relation to the impacts from the proposal of the TEC.

a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:

i. in hectares

ii. as a percentage of the current geographical extent of the TEC in NSW

b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:

i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals

ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:

- distance between isolated areas of the TEC, presented as the average
- distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
- estimated maximum dispersal distance for native flora species characteristic of the TEC, and
- other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development

iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone (s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

Response to BAM Section 9.1.1 Criteria

a. The Project will impact approximately 699.63 ha of this CEEC including approximately 23.64 ha of vegetation which is described as scattered trees and 675.99 ha which is described as a derived native grassland, including 507.5 ha which is too disturbed to require biodiversity offsetting.

Tozer and Simpson (2020) have identified that not all the areas occupied by White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland are covered by maps of appropriate scale and accuracy. Therefore, the values for extent of occurrence and area of occupancy quoted may underestimate the true values.

The best available information on the current geographic extent of this CEEC across its range is estimated from the SVTM as between 1,267,603 ha and 1,639,571 ha within NSW, as mapped in **Figure 9.3**. It is considered that this is likely to be an underestimate given there are many areas of derived native grasslands corresponding to this CEEC which are not mapped as part of the SVTM.

The Project will impact between 0.05% and 0.04% of the geographic extent of this CEEC mapped in the SVTM. It is considered that the actual proportional impact is likely to be much lower due to the presence of large areas of highly degraded derived native vegetation which are not captured in the SVTM.

b. The Project will not isolate any areas of the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC, as four discreet Project areas are proposed with connecting areas to be retained both between these areas and around the outside of the Development Footprint.

The Project will fragment areas of the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC in derived native grassland form within the south-eastern section of the site from other retained areas of the CEEC within the northern and western sections of the site but, as stated, not isolate these from surrounding native vegetation. However, these areas were already separated by highly disturbed agricultural use areas. The fragmentation will occur through the removal of areas of highly degraded derived native grassland vegetation and scattered trees. The retained areas will remain connected through other vegetation communities both within the Project Area and the adjoining Goulburn River National Park.

The separation distance that will result between the retained areas of White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC in the western and south-eastern parts of the Project Area is approximately 560 m to >1300 m. These areas would remain connected through a highly disturbed agricultural landscape if the Project was to not proceed.

The main dispersal mechanisms for flora species associated with the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC are inferred to be by one or a combination of dispersal mechanisms, including animals, wind, water runoff, and gravity.

Eucalypts within the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC are likely to rely on animal assisted dispersal by highly mobile vertebrate pollinators (birds and bats) which disperse pollen over large areas when foraging (Southerton *et al.* 2004).

The maximum dispersal distance for native flora species characteristic of the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland ecological community is estimated to be at least 1,000 m and potentially much further.

The Project will increase the area to perimeter ratio of the remaining areas of derived native grassland associated with the Box Gum TEC, as the Project area is situated centrally within an occurrence of mostly derived native grassland associated the White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC.

Response to BAM Section 9.1.1 Criteria

Within the Development Footprint, areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC correspond to PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley. All of these areas have been degraded over a relatively long time period by agricultural management, which has included clearing of trees and understorey vegetation, grazing and pasture improvement. Impacts to areas of intact White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Project Area have been avoided.

The Vegetation Condition Zones and corresponding areas for this PCT are:

- PCT 483 Condition Zone 1 – Scattered Trees = 23.64 ha.
- PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 168.48 ha.
- PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 308.37 ha.
- PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 199.14 ha.

The Vegetation integrity scores for the above vegetation condition zones are:

- PCT 483 Condition Zone 1 – Scattered Trees = 78.
- PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1.
- PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 12.4.
- PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9.

5. The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAI is not accurate.

The White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is identified as at risk of an SAI under Principles 1 – Species or ecological community currently in rapid rate of decline and under Principle 2 – Species or ecological communities with very small population size.

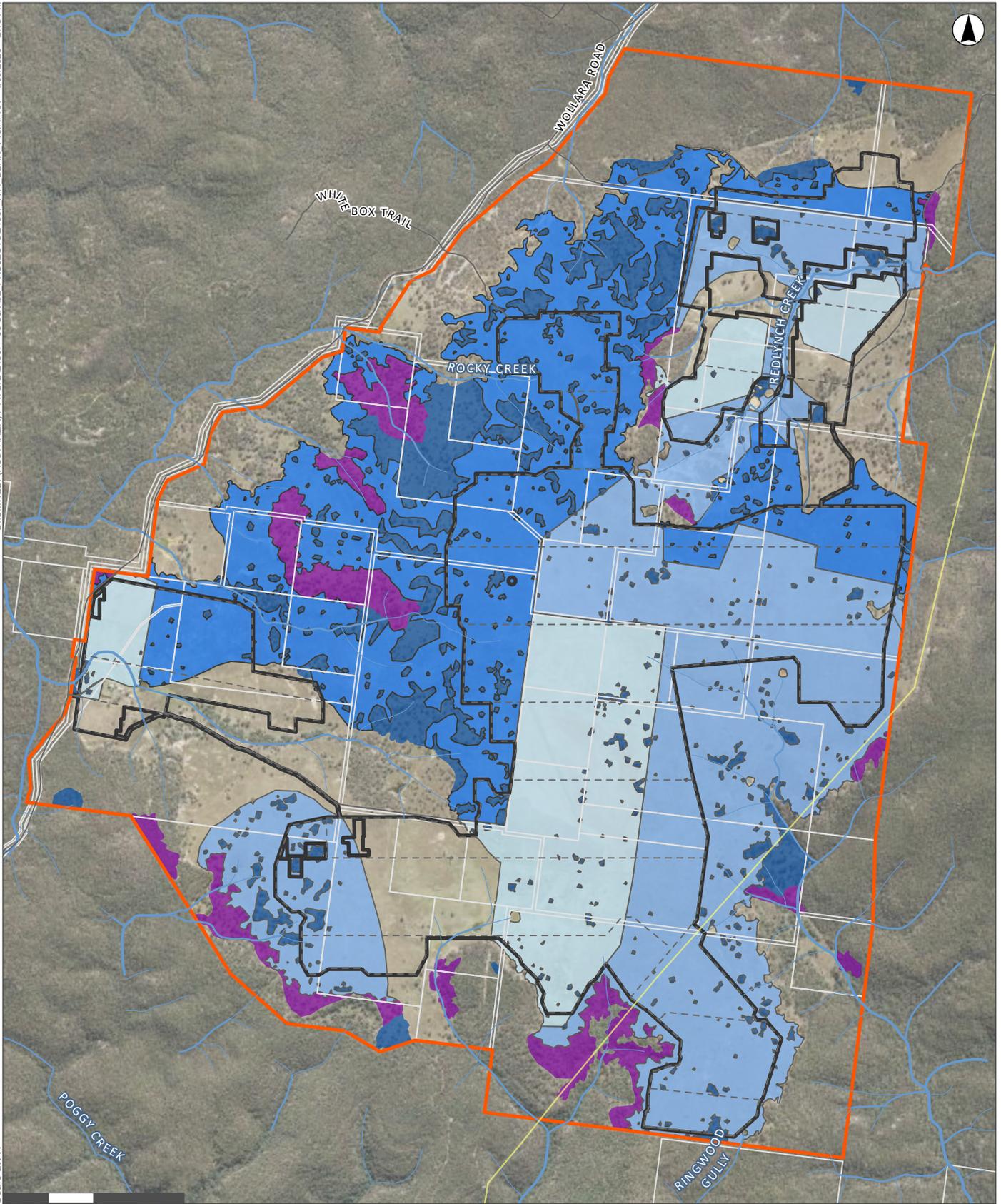
According to DPIE (2019), very small population size for ecological communities includes communities that have very high levels of either environmental degradation or disruption of biotic processes, and interactions have an increased risk of failure to sustain their characteristic native species assemblages.

It is considered that the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC does not have a very small population size (SAI Principle 2), based on the current information available from the SVTM, but has experienced high levels of environmental degradation and a very large disruption of biotic processes.



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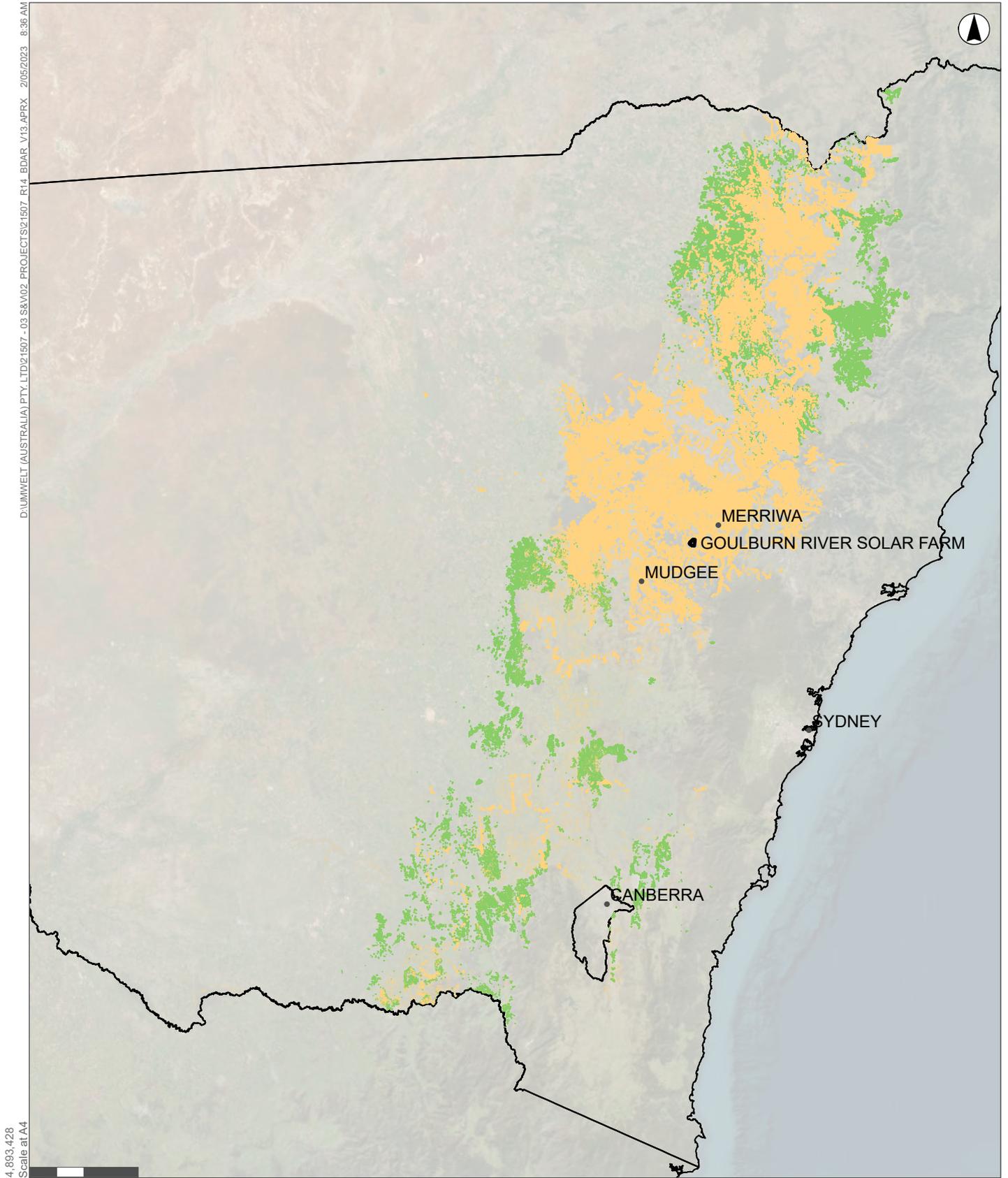
GDA 1994 MGA Zone 56

- Legend**
- Electricity Transmission Line
 - - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Property Boundaries
 - Development Footprint
 - Project Area

- Box Gum Woodland CEEC**
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Low Condition Derived Native Grassland
 - Moderate to Low Condition Derived Native Grassland
 - Moderate Condition Derived Native Grassland
 - Scattered Trees Condition Zone
 - Intact Woodland Condition Zone

FIGURE 9.2

**Box Gum Woodland CEEC
Impact Avoidance**



1:4,893,428
Scale at A4

0 50 100 Kilometres

GDA 1994 MGA Zone 56

Legend

● Populated Place

▭ State Borders

▭ Project Area

Box Gum Woodland CEEC NSW Distribution (based on NSW State Vegetation Type Map)

■ Part Association

■ Full Association

FIGURE 9.3

Box Gum Woodland CEEC NSW Distribution (based on NSW State Vegetation Type Map)

9.1.2 Additional Impact Assessment Provisions for Threatened Species at Risk of an SAI

9.1.2.1 Regent Honeyeater (*Anthochaera phrygia*)

The additional impact assessment provisions for threatened species at risk of an SAI have been addressed for the Regent Honeyeater in **Table 9.3**. This species is listed as critically endangered under the BC Act and the EPBC Act.

Table 9.3 All Impact Assessment – Regent Honeyeater

Response to BAM Section 9.1.2 Criteria
<p>1. The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAI, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAI. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.</p>
<p>Measures proposed to avoid direct and indirect impacts on this species are documented in Section 7.0 of this report. Impact and impact avoidance areas for areas of mapped Important Regent Honeyeater Habitat are shown in Figure 9.4.</p>
<p>2. The assessor must consult the TBDC and/or other sources to report on the current population of the species including:</p> <p>a. Evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:</p> <ul style="list-style-type: none"> i. Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or ii. Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites <p>b. Evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:</p> <ul style="list-style-type: none"> i. An estimate of the species' current population size in NSW, and ii. An estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and iii. Where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations <p>c. Evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:</p> <ul style="list-style-type: none"> i. Extent of occurrence ii. Area of occupancy

Response to BAM Section 9.1.2 Criteria

- iii. **Number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and**
- iv. **Whether the species' population is likely to undergo extreme fluctuations**
- d. **Evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:**
 - i. **Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g., Species is clonal) on, a biodiversity stewardship site**
 - ii. **The species is reliant on abiotic habitats which cannot be restored or replaced (e.g., Karst systems) on a biodiversity stewardship site, or**
 - iii. **Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g., Frogs severely impacted by chytrid fungus).**

The TBDC has been reviewed in relation to the information available Regent Honeyeater. Additional sources relied upon are referenced within the text below.

- a. The TBDC identifies that this species meets the criteria of a population reduction of >80% in 10 years or three generations.

The Regent Honeyeater Recovery Plan also confirms that the Regent Honeyeater had prior to 2011 undergone a population decline of >80% within three generations (Commonwealth of Australia 2016).

The NSW Scientific Committee (2010) have identified that generation length is estimated at 5 years or 15 years for three generations.

Crates et al., 2020 estimated that there are fewer than 350 individuals which persist in the wild.

The NSW Scientific Committee's (2010) final determination to list the Regent Honeyeater as critically endangered estimated that there may have been fewer than 250 mature individuals left in the wild. The National Recovery Plan for this species estimates the population in 2010 at 350–400 mature individuals (Commonwealth of Australia 2016).

The population of the regent honeyeater has declined significantly prior to the last 15 years and population monitoring is impeded by small population size coupled with a very large area of occupancy and this species nomadic behaviour.

The 2019/20 mega fires that impacted the east coast of Australia represent a significant pulse impact event on the habitat quality of this species.

Crates *et al.*, 2020 have estimated that the 2019/20 mega fires burnt an estimated 71,011 square kilometres representing 13% of the species area of occupancy with high to very high burn severity identified for 54% of the burned area. Crates *et al.*, 2020 also identified that assessment based on regent honeyeater nest locations since 2015 returned the most severe fire impact estimate, with 44% of 1 km grid cells where nesting has been recorded, having been affected by fire.

The impact of the 2019/20 mega fire event is also likely to have exacerbated reduction in suitable foraging and breeding habitat from extensive land clearing and competition from larger honeyeater species such as the Noisy Miner.

Response to BAM Section 9.1.2 Criteria

b. The TBDC identifies that this species meets the criteria for a population size of <50 individuals or <250 individuals where threats are known.

Crates et al., 2020 estimated that there are fewer than 350 individuals which persist in the wild.

Population monitoring is impeded by small population size coupled with a very large area of occupancy, population fluctuations in particular areas and nomadic behaviour. Provision of an accurate estimation of the decline in the species' population size in NSW in one generation (5 years) is not possible based on current available data.

This species is not likely to undergo extreme fluctuations.

c. The Regent Honeyeater has a relatively large geographic range compared to its current population size. *Crates et al.*, 2020 estimates that the extent of occurrence for this species based on records from 1996 onwards is 605,690 km². BCD have estimated the extent of occurrence as 367,167 km².

Crates et al., 2020 estimates that the area of occupancy for this species based on records from 1996 onwards is 1226 km². BCD have estimated the area of occupancy as 3,204 km².

BCD have identified that the Important Mapped Habitat Areas include nine (9) locations and of these four (4), are considered critical to the survival of the species: Bundarra-Barraba, Mudgee-Wollar, Capertee Valley and Hunter Valley. It is considered that the breeding sites are likely to be critical to the species survival and the Development Footprint which contains habitat in the form of scattered trees within degraded agricultural land mapped within the buffer to a breeding location is not critical to the species survival.

Based on available data it is considered that this species' population is not likely to undergo extreme fluctuations and the population trend reported in the scientific literature is of a continuing decline.

d. There is no data in the TBDC or the scientific literature supporting that the species known reproductive characteristics severely limit its ability to increase existing population on, or occupy new habitat, however this species is difficult to manage on a site-by-site basis due to its nomadic nature and the ability to increase the population on biodiversity stewardships sites is limited.

The species is not likely to be reliant on abiotic habitats which cannot be restored or replaced on a biodiversity stewardship site.

It is accepted that historical declines in the population of this species are attributable to extensive land clearing. Lack of breeding success is now considered to be one of the main reasons for the continuing population decline of the Regent Honeyeater due to threats such as competition from aggressive and larger honeyeaters and predation by natural predators. There is potential that these threats could be managed at a biodiversity stewardship site in limited circumstances, such as where nest sites are present and can be protected (*Crates et al.*, 2018).

3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR or BCAR.

The TBDC does not specifically indicate that data is unknown or deficient for this species.

Response to BAM Section 9.1.2 Criteria

4. In relation to the impacts from the proposal on the species at risk of an SAI, the assessor must include data and information on:

a. The impact on the species' population (Principles 1 and 2) presented by:

i. An estimate of the number of individuals (mature and immature) present in the subpopulation on the Development Footprint (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and

ii. An estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or

iii. If the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal

b. Impact on geographic range (Principles 1 and 3) presented by:

i. The area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW

ii. The impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted

iii. To determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g., Seed dispersal) and pollination distance for the species

iv. To determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections.

In relation to the impacts from the proposal on the species at risk of an SAI, the assessor must include data and information on:

a. The potential serious and irreversible impact trigger for this species is identified as removal of mapped important habitat, although other impacts may also result in a SAI on this species.

Response to BAM Section 9.1.2 Criteria

Areas identified in The National Recovery Plan (2016) as critical to the survival of the species formed the basis of the important habitat mapping in the BAM. These were refined to only include areas of suitable habitat based on expert opinion and PCTs associated with the species. A dataset of occurrence records was generated from BioNet, BirdLife Australia, Australian National University Difficult Bird Research Group and expert opinion of historic, unrecorded breeding. Records were overlaid on the refined areas. All woodland vegetation within 200 m of a record was added. Records of known breeding events that occurred outside of the polygons created above were identified. Radial buffers of 1 km were applied to single breeding events (once off breeding at a location) and 5 km buffers applied to multiple breeding events (multiple events in the same year or over multiple years at one location). All woodland vegetation was selected within 1 km buffers. Within 5 km buffers, PCTs associated with the species were selected, along with all woodland vegetation within 200 m of a record.

The Development Footprint is surrounded by the Goulburn River National Park, where multiple breeding events have been recorded both within the National Park and on adjoining lands (not within the Project Area). It is likely that the Development Footprint is within a 5 km buffer area of a breeding location.

No Regent Honeyeaters have been observed on the Development Footprint during surveys. This species is mobile and highly nomadic and may travel through or forage within the Development Footprint from time to time.

Six Regent Honeyeater pairs (12 mature individuals) nested within an area where Noisy Miners were culled within the Goulburn River National Park in 2017 (Crates et al., 2020). It is estimated that approximately 12 individuals or less than 5% of the remaining population of Regent Honeyeaters may forage within or travelling through the Development Footprint at any one time. It is considered unlikely that this species would breed within the Development Footprint.

It is considered that the Project would not have a measurable impact on the Regent Honeyeater and that an overall improvement of the best habitats present would result if a BSA was established over the residual parts of the site outside of the Development Footprint.

As identified above six Regent Honeyeater pairs (12 mature individuals) nested within an area where Noisy Miners were culled within the Goulburn River National Park in 2017 (Crates et al., 2020). It is estimated that approximately 12 individuals or less than 5% of the remaining population of Regent Honeyeaters may forage within or travel through the Project Area at any one time.

The species polygon for this species is mapped as 44.96 ha.

b. The Project will impact a total of 44.96 ha of mapped important habitat of which approximately 20.93 ha contains woody vegetation suitable for foraging. The remaining 24.03 ha of the species polygon / mapped important habitat corresponds to derived native grassland habitat which is not likely to support this species as foraging or breeding habitat. The Project will impact approximately 0.037% of this species area of occupancy based on the area of occupancy estimated by Crates *et al.*, 2020 as 1226 km² or 0.014% of this species area of occupancy based on the BCD area of occupancy estimate of 3204 km².

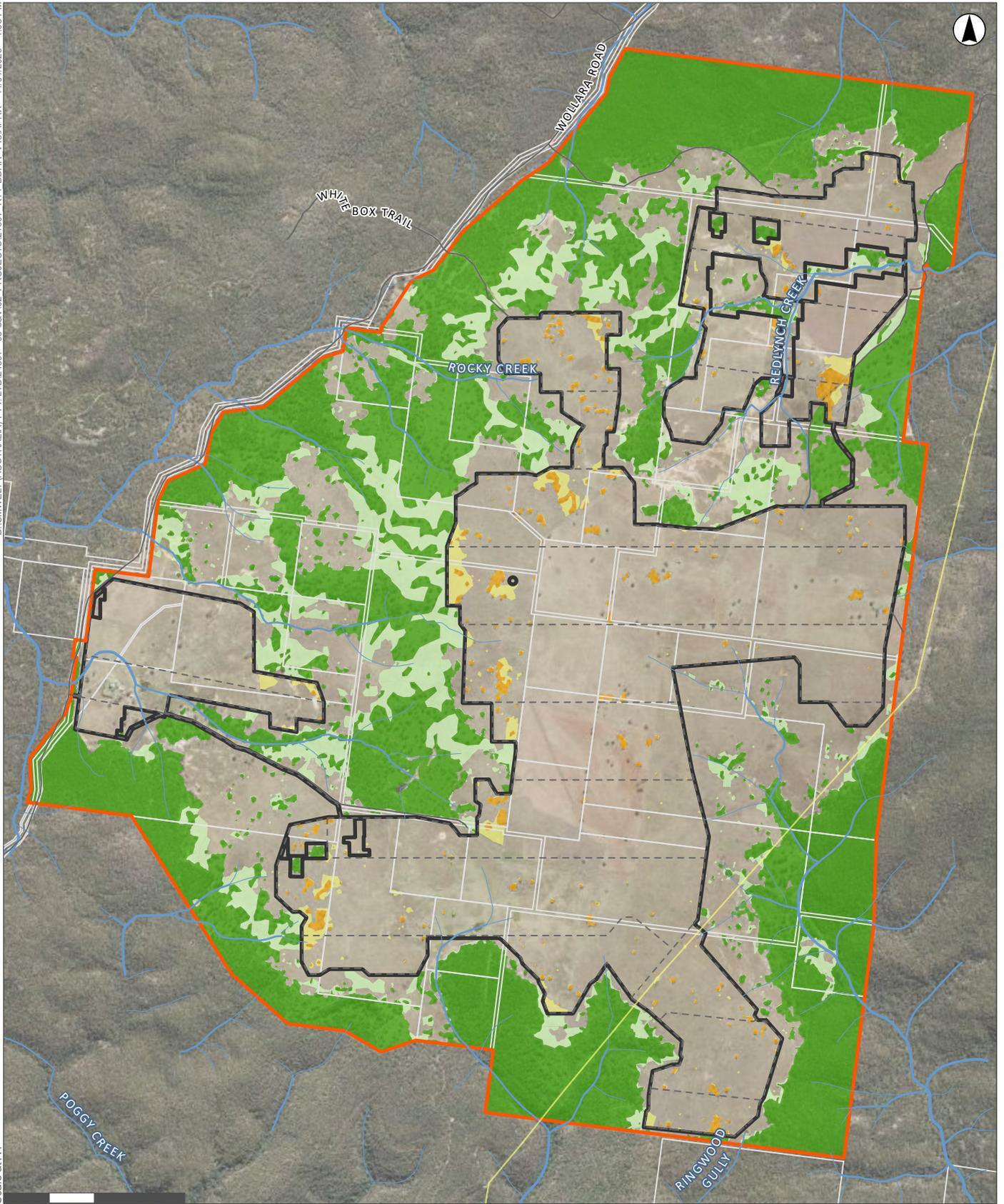
It is considered that the Project will affect some habitat for this species, but no individuals or known nesting locations of the species will be directly impacted and the Project will not fragment any subpopulation of the Regent Honeyeater as this species is highly mobile and nomadic.

Response to BAM Section 9.1.2 Criteria

The Project may exacerbate impacts associated with habitat loss and competition from larger or more aggressive bird species such as the Noisy Miner which favours disturbed landscapes and forest edge habitats. However, these impacts have potential to be mitigated through the establishment of a BSA across the residual parts of the site and the restoration and ongoing management of these areas for conservation. Management measures may include replanting, monitoring for Regent Honeyeaters and control of predators and/or over abundant competitors such as the Noisy Miner.

5. The assessor may also provide new information that can be used to demonstrate that the principle identifying the species as at risk of an SAII, is inaccurate.

Not applicable.



- Legend**
- Electricity Transmission Line
 - - Proposed Access Tracks
 - Existing Roads and Tracks
 - Watercourse
 - Property Boundaries
 - Development Footprint
 - Project Area

- Regent Honeyeater Important Habitat**
- Removed Grassland and Cleared Areas
 - Removed Treed Areas
 - Retained Grassland and Cleared Areas
 - Retained Treed Areas

GDA 1994 MGA Zone 56

FIGURE 9.4

Regent Honeyeater Impact Avoidance

10.0 Impact Summary

10.1 Determining an Offset Requirement for Impacts

10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits)

The PCTs and associated condition zones which do not require an offset (as per BAM Subsection 9.2.1(3.)), are listed in **Table 10.1** and the PCTs which require ecosystem credits are listed in **Table 10.2**.

Table 10.1 Impacts that Do Not Require Offset – Ecosystem Credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC Association	Entity at risk of an SAI?	Current VI score
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes / CEEC	308.37	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	12.4
PCT 483 Condition Zone 4 - Low Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes / CEEC	199.14	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	9.9
PCT 1661 Condition Zone 2 - Moderate to Low Condition Derived Native Grassland	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	36.79	None	No	13.2
PCT 1661 Condition Zone 3 - Low Condition Derived Native Grassland	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	53.24	None	No	3.3

Table 10.2 Impacts that Require an offset – Ecosystem Credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 483 Condition Zone 1 – Scattered Trees	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes	23.64	78	0	-78	2.5	1152
PCT 483 Condition Zone 2 - Moderate Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes	168.48	33.1	0	-33.1	2.5	3490
PCT 1661 Condition Zone 1 – Scattered Trees	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	6.07	51.1	0	-51.1	1.75	136
Total Ecosystem Credits								4778

10.1.2 Impacts on Threatened Species and their Habitat (Species Credits)

Table 10.3 provides a summary of the species credit threatened that require an offset (as per BAM Subsection 9.2.2(2.)) and identifies the amount of credits required. The area within the Development Footprint which was included within the total of all species polygons is shown in **Figure 10.1**.

Table 10.3 Impacts that Require an Offset – Species Credits

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE	44.96	3	1546
Barking Owl	<i>Ninox connivens</i>	V	-	1.21		7
Total Species Credits						1553

10.1.3 Indirect and Prescribed Impacts

No offsets are required or proposed for indirect and prescribed impacts.

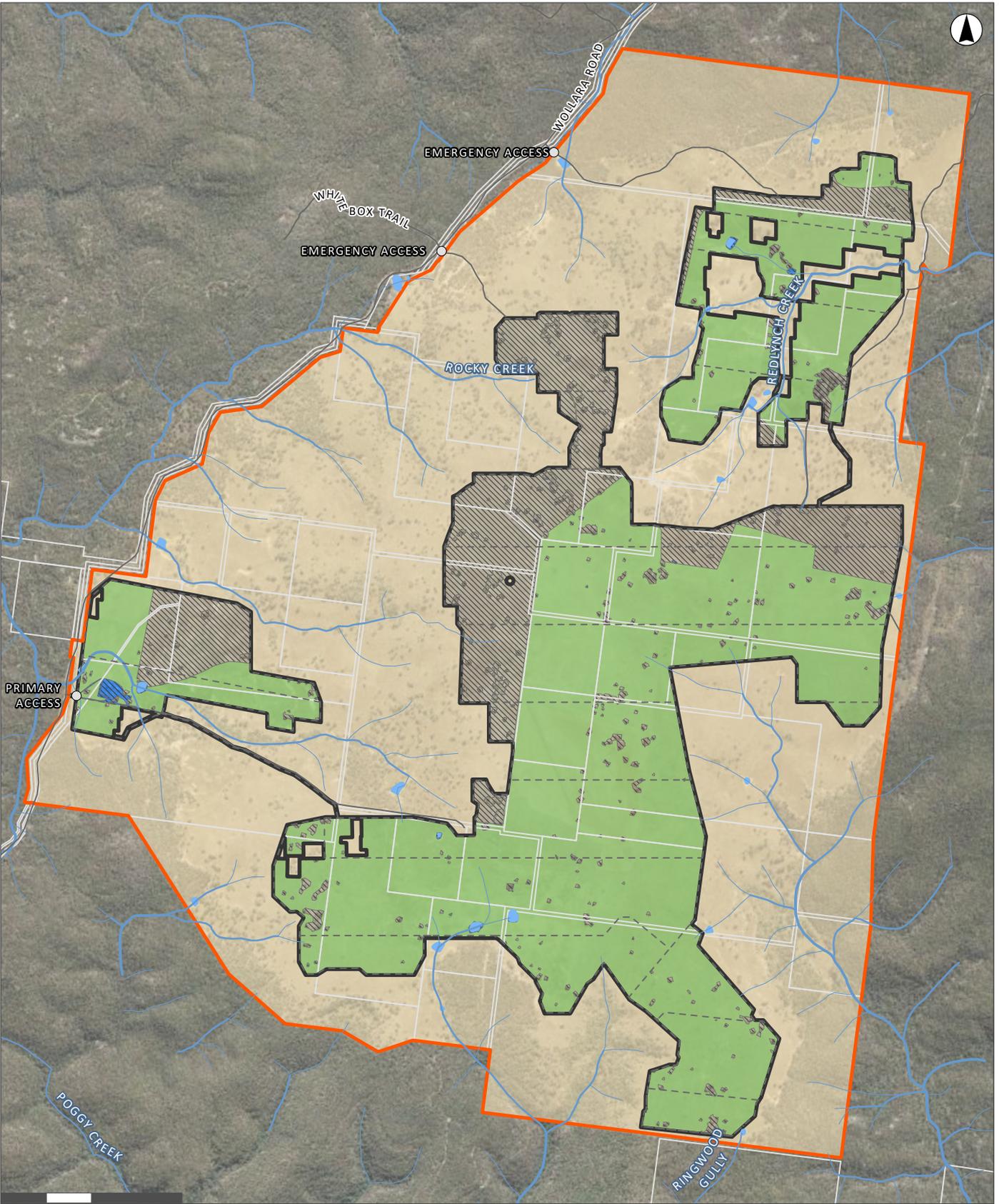
10.2 Impacts That Do Not Need Further Assessment

Areas within the Development Footprint that do not contain native vegetation do not need to be assessed for ecosystem credits (as per BAM Section 9.3(1–2.)). Areas assessed as not containing native vegetation are limited to waterbodies, particularly farm dams, land which is totally cleared of all vegetation such as frequently used existing vehicle tracks and a small area of exotic vegetation around the existing dwelling.



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GDA 1994 MGA Zone 56

Legend

- Access Points
- - Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Waterbodies
- Property Boundaries
- Development Footprint
- Project Area
- Impact Avoidance Areas (no offset required)
- Impact Areas which Do Not Contain Native Vegetation (no offset required)
- Impact Areas Containing Native Vegetation (no ecosystem credit offset required due to low VI score)
- Impact Areas Which Contain Native Vegetation and Require Offsets (ecosystem credits)

FIGURE 10.1

Thresholds for Assessing and Offsetting Impacts

11.0 Biodiversity Credit Report

Biodiversity Credit Reports which identify the like-for-like and variation credit requirements are provided in **Appendix D**.

11.1 Ecosystem Credits

The ecosystem credit requirements and those that could be retired in accordance with the offset rules are listed in **Table 11.1**.

Table 11.1 Ecosystem Credit Class and Matching Credit Profiles

Ecosystem Credit	Rule Type	Attributes shared with matching credits						
		PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC	Offset trading group	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley 4642 credits (includes credits for part of PCT which does not correspond to EPBC Act Listed CEEC)	Like for Like	74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698	Grassy Woodlands	Western Slopes Grassy Woodlands	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	1152 credits = yes 3490 credits = no	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

Ecosystem Credit	Attributes shared with matching credits							
	Rule Type	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC	Offset trading group	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
PCT 1661 Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin 136 credits	Like for Like	54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	No	Western Slopes Dry Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

11.2 Species Credits

The species credit requirements and those that could be retired in accordance with the offset rules are listed in Table 11.2.

Table 11.2 Species Credit Class and Matching Credit Profiles

Species credit	Attributes shared with matching credits				
	Name of threatened species	Kingdom	BC Act status	EPBC Act status	IBRA region
Regent Honeyeater 1546 Credits	Like for Like Rules: Regent Honeyeater	Fauna	Critically endangered	Critically endangered	Like for Like Rules: Any in NSW
Barking Owl 7 Credits	Like for Like Rules: Barking Owl	Fauna	Vulnerable	-	Like for Like Rules: Any in NSW

11.3 Biodiversity Offset Strategy

Lightsource bp is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project.

Lightsource bp has, where practicable, altered the Project to avoid and minimise ecological impacts in the planning stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

The retirement of biodiversity credits is proposed to be undertaken following a staged approach, to match the areas of staged clearing. Lightsource bp is currently considering the merits of all options available under the BOS to satisfy the offsetting requirements for the Project. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The Proponent has committed to further investigate the retirement of biodiversity credits through the establishment of a Biodiversity Stewardship Site within the residual parts of the proposed Goulburn River Solar Farm property and this may include ecological rehabilitation of land to generate biodiversity credits. Where credits are not directly generated and retired through a Biodiversity Stewardship Agreement within the Goulburn River Solar Farm property, they would be purchased from the market or a payment would be made to the Biodiversity Conservation Fund. The like-for-like credit rules would be followed for nationally listed entities which require credits. The like-for-like or variation rules would be followed for all other entities which require credits.

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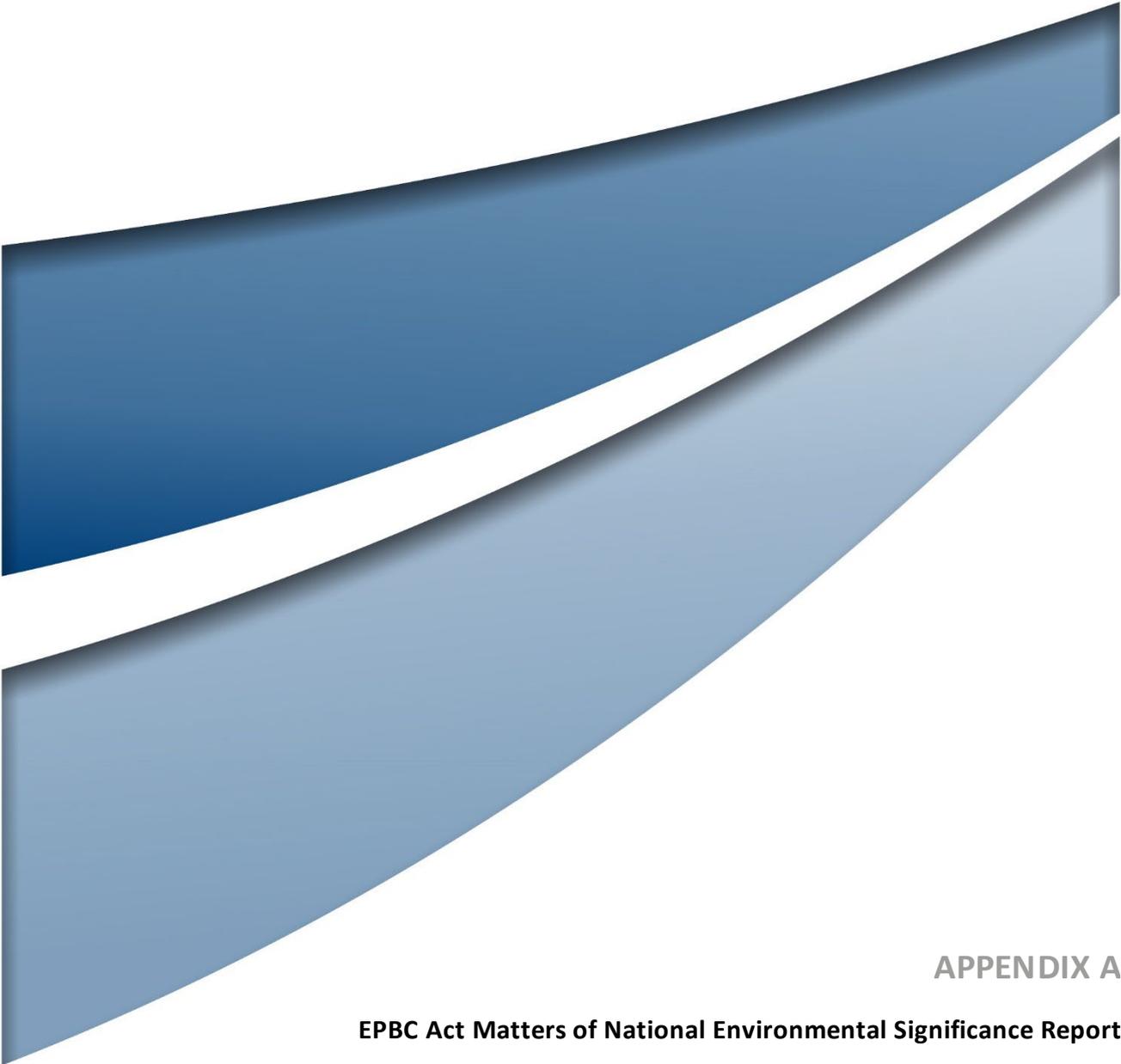
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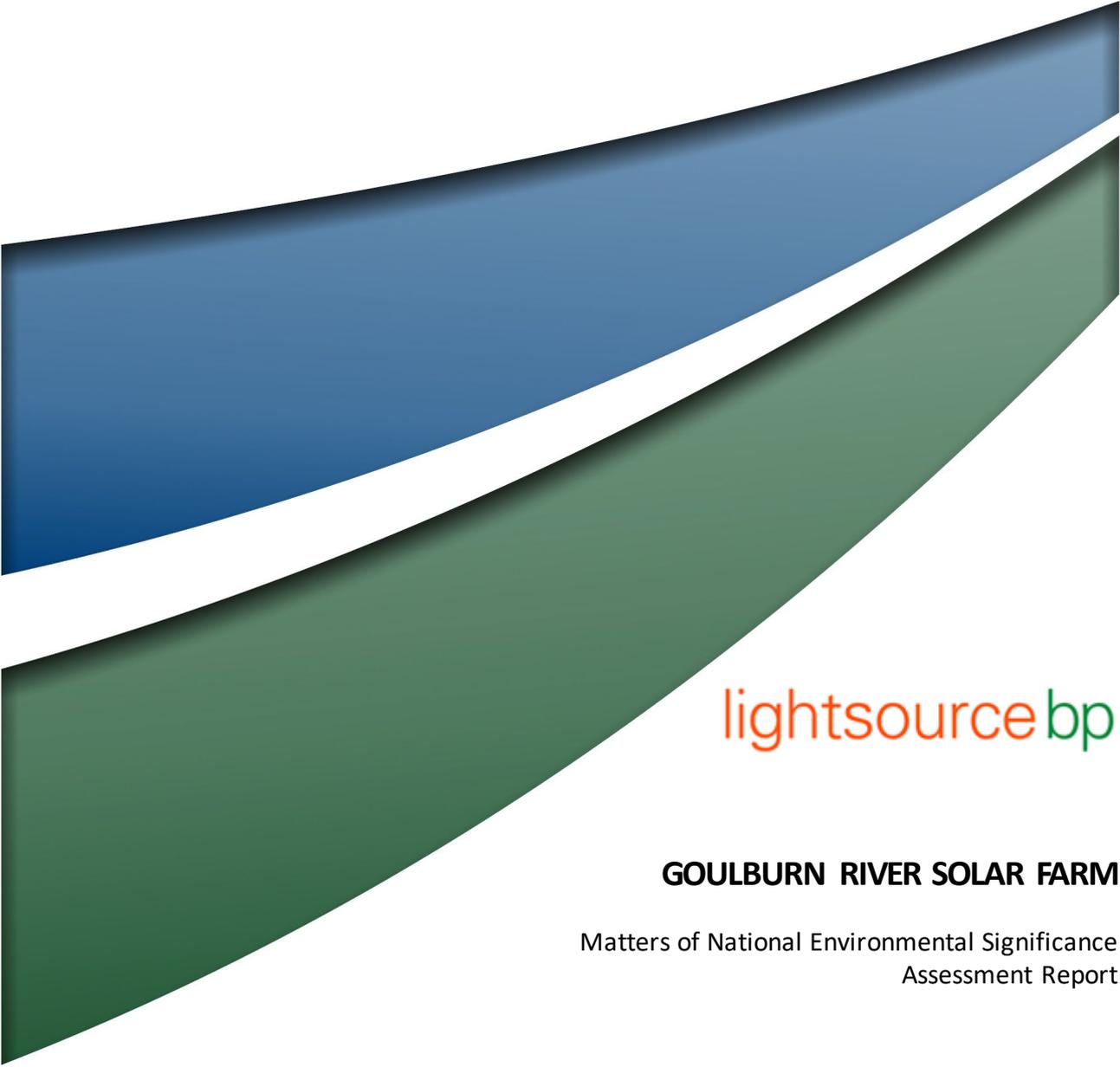
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APPENDIX A

EPBC Act Matters of National Environmental Significance Report



lightsource bp

GOULBURN RIVER SOLAR FARM

Matters of National Environmental Significance
Assessment Report

FINAL

May 2022



GOULBURN RIVER SOLAR FARM

Matters of National Environmental Significance
Assessment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Lightsource Development Services

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Document Status

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Abbreviations

Abbreviation	Definition
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BESS	Battery Energy Storage System
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
BSA	Biodiversity Stewardship Agreement
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
Development Footprint	The area of land that is directly impacted by a proposed development.
Development Site	An area of land that is subject to a proposed development under the EP&A Act, including areas which will be retained and impacted by the proposal (synonymous with Development Footprint).
EIS	Environmental Impact Statement
GIS	Geographic Information Systems
Ha	hectares
km	kilometres
LGA	Local Government Area
m	metres
mm	millimetres
MNES	Matters of National Environmental Significance
MWh	Megawatt hour
MWp	Megawatt peak
NSW	New South Wales
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Project Area	The broader property area that the subject land is located within.
the Project	Goulburn River Solar Farm
SEARs	Secretary's Environmental Assessment Requirements
TEC	Threatened Ecological Community
TSSC	Commonwealth Threatened Species Scientific Committee

Table of Contents

Abbreviations		i
1.0 Introduction		1
1.1	Background	1
1.2	NSW and Commonwealth Bilateral Agreement	1
1.3	EPBC Act Referral Outcome and Advice	2
1.4	Project Description	6
1.4.1	The title of the action, background to the action and current status	6
1.4.2	The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES	6
1.4.3	How the action relates to any other actions that have been, or are being taken in the region affected by the action	7
1.4.4	How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES	8
2.0 Methods		10
2.1	Desktop Literature and Database Review	10
2.2	MNES Likelihood of Occurrence Assessment	10
2.3	Field Surveys	21
2.3.1	Plant Community Type Mapping	21
2.3.2	Plant Community and Threatened Ecological Community Surveys	21
2.3.3	EPBC Act Listed Threatened Species Surveys	23
3.0 Survey Results		29
3.1	Plant Community Types and Threatened Ecological Communities	29
3.2	Threatened Ecological Community Considerations	31
3.3	Threatened Flora Species	31
3.4	Threatened Fauna Species	31
3.4.1	Species Credit Fauna Species Observed	31
3.4.2	Mapped Important Habitat Species	31
4.0 MNES Impact Assessment		32
4.1	Determination of MNES Likely to be Impacted by the Project	32
4.2	EPBC Act Significant Impact Assessments	42
4.2.1	White Box - Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland	42

4.2.2	Regent Honeyeater (<i>Anthochaera phrygia</i>)	45
4.2.3	Southern Whiteface (<i>Aphelocephala leucopsis</i>)	48
4.2.4	Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)	50
4.2.5	Large-Eared Pied Bat (<i>Chalinolobus dwyeri</i>)	52
4.2.6	Brown Treecreeper (South-Eastern) (<i>Climacteris picumnus victoriae</i>)	55
4.2.7	Spotted-Tailed Quoll (<i>Dasyurus maculatus maculatus</i>) (South-East Mainland Population)	57
4.2.8	Painted Honeyeater (<i>Grantiella picta</i>)	60
4.2.9	White-Throated Needletail (<i>Hirundapus caudacutus</i>)	62
4.2.10	Swift Parrot (<i>Lathamus discolor</i>)	65
4.2.11	South-Eastern Hooded Robin (<i>Melanodryas cucullata cucullata</i>)	67
4.2.12	Diamond Firetail (<i>Stagonopleura guttata</i>)	69
4.2.13	Koala (Combined Populations of QLD, NSW, ACT) (<i>Phascolarctos cinereus</i>)	72
4.2.14	Corben's Long-Eared Bat (<i>Nyctophilus corbeni</i>)	74
4.2.15	Grey-Headed Flying-Fox (<i>Pteropus poliocephalus</i>)	76
4.3	Additional Analysis of Impacts of 2019–2020 Bushfires for Priority Management Species	79
4.3.1	Koala (<i>Phascolarctos cinereus</i>)	79
4.3.2	Greater Glider (<i>Petauroides volans</i>)	80
4.3.3	Brush-Tailed Rock Wallaby (<i>Petrogale penicillata</i>)	80
4.3.4	Spotted-Tailed Quoll (<i>Dasyurus maculatus maculatus</i> – South-East Mainland Population)	80
4.3.5	New Holland Mouse (<i>Pseudomys novaehollandiae</i>)	80
4.3.6	Grey-Headed Flying-Fox (<i>Pteropus poliocephalus</i>)	81
4.4	EPBC Act Significant Impact Assessment Conclusions	81
5.0	References	82

Tables

Table 1.1	Commonwealth supplementary SEARs for Solar Farm component of the Project	3
Table 2.1	MNES Likelihood of Occurrence Assessment	12
Table 2.2	Plant Community Type Survey Plot Stratification Details	22
Table 2.3	Surveys Targeting Threatened EPBC Act Listed Flora Species	24
Table 2.4	Surveys Targeting Threatened and Migratory EPBC Act Listed Fauna Species	25
Table 3.1	Plant Community Types and TEC Associations	30
Table 4.1	Determination of MNES Likely to be Impacted by the Project	33

1.0 Introduction

1.1 Background

Lightsource Development Services Australia Pty Ltd (Lightsource bp) have engaged Umwelt (Australia) Pty Ltd (Umwelt) to prepare this Matters of National Environmental Significance (MNES) Report for the proposed Goulburn River Solar Farm (the Project) within the locality of Merriwa, NSW.

The Solar Farm component of the Project has been determined to be a controlled action and requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Decision on Referral Letter from the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of Agriculture, Water and the Environment (DAWE), now superseded) (Reference 2021/9102), identifies that the Project has the potential to impact on several nationally listed threatened species and ecological communities which are further assessed within this Report. It should be noted that the Public Road and Culvert Upgrade component of the Project does not form part of the controlled action determination as the impacts associated with that component of the Project are not considered to be significant.

This Appendix consolidates the DCCEEW assessment requirements, as provided in the supplementary Secretary's Environmental Assessment Requirements (SEARs) for the project, issued on 2 February 2022 as part of the controlled action determination (EPBC 2021/9102).

The Biodiversity Assessment Method (BAM) has been endorsed as the assessment method for MNES under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act.

1.2 NSW and Commonwealth Bilateral Agreement

The Bilateral Agreement made under Section 45 of the EPBC Act relating to environmental assessment between the Commonwealth of Australia and NSW was signed by both parties in 2015. This Agreement enables NSW to conduct a single environmental assessment process. When the assessment process is complete, NSW provides a report to the Australian Government assessing the likely impacts on MNES listed under the EPBC Act.

An Amending Agreement between the Commonwealth and NSW was entered into on 24 March 2020, which endorses the NSW BAM (DPIE 2020a). Offsets are required under the EPBC Act for any residual significant adverse impacts on MNES. The Assessment Bilateral Agreement applies to all NSW projects that require EPBC Act approval to achieve streamlining benefits for projects that use the Biodiversity Offset Scheme (BOS).

A Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the BAM, to assess the biodiversity related impacts associated with the Project. Relevant information and results obtained from site surveys associated with the BDAR preparation have been reviewed and incorporated into this report.

1.3 EPBC Act Referral Outcome and Advice

The Project has been determined to be a Controlled Action and requires approval under the EPBC Act. The DCCEEW have identified that based on the information in the referral documentation, the location of the action, species records and likely habitat in the area there are likely to be significant impacts to:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered.
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered.

DCCEEW have also identified that additionally there is some risk that there may be significant impacts on the following further matters and further assessment is required to determine if the following communities and species are present in the proposed action area and if so, the extent to which they may be impacted by the proposed action:

- Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered.
- Swift Parrot (*Lathamus discolor*) – Critically Endangered.
- Painted Honeyeater (*Grantiella picta*) – Vulnerable.
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable.
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable.
- Pink tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable.
- Bluegrass (*Dichanthium setosum*) – Vulnerable.
- Homoranthus darwinioides – Vulnerable.

DCCEEW have also requested further analysis of the impacts of the 2019–2020 bushfires on the following species as part of this assessment:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland.
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered.
- Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – Vulnerable.
- Greater Glider (*Petauroides Volans*) – Vulnerable.
- Brush tailed Rock wallaby (*Petrogale penicillata*) – Vulnerable.
- Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – Endangered.
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable.

Biodiversity requirements included in the supplementary SEARs are reproduced in **Table 1.1**, which lists the relevant section of this report and the Solar Farm BDAR (Umwelt 2023) that specifically addresses that requirement.

Table 1.1 Commonwealth supplementary SEARs for Solar Farm component of the Project

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
General requirements – Relevant regulations	5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) and all matters outlined below in relation to the controlling provisions.		
General requirements – Project description	6. The title of the action, background to the action and current status.	Section 1.4.1	
	7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	Section 1.4.2	
	8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	Section 1.4.3	Section 1.4.3
	9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	Section 1.4.4	
General requirements – Impacts	<p>10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including:</p> <ul style="list-style-type: none"> i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; iii. analysis of the significance of the relevant impacts; and iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts. 	Section 4.0	Section 8.0

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
General requirements – Avoidance, mitigation, and offsetting	<p>11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:</p> <ul style="list-style-type: none"> i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, v. any statutory policy basis for the mitigation measures; vi. the cost of the mitigation measures; vii. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; viii. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program. 	<p>Section 4.0</p>	<p>Section 7.0 and Section 8.4</p>
	<p>14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15–17.</p>		
Biodiversity (threatened species and communities and migratory species)	<p>15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.</p>	<p>Section 2.2</p>	<p>Section 2.3 Section 2.4 Section 5.1 Section 5.2</p>
	<p>16. For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate:</p> <ul style="list-style-type: none"> • description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; • details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; 	<p>Section 2.0 Section 3.0 Section 4.0</p>	<p>Section 2.0 Section 4.0 Section 5.0 Section 7.0 Section 8.0 Section 10.0 Section 11.0</p>

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
	<ul style="list-style-type: none"> description of the relevant impacts of the action having regard to the full national extent of the species or community's range; description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established; details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites. <p>Note: For the purposes of approval under the EPBC Act, it is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action and deliver an overall conservation outcome that improves or maintains the viability of the MNES i.e. 'like for like'. In applying the BAM, residual impacts on EPBC Act listed TECs must be offset with Plant Community Type(s) (PCT) that are ascribed to the specific EPBC listed ecological community. PCTs from a different vegetation class will not generally be acceptable as offsets for EPBC listed communities.</p>		
	<p>17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. (http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.)</p>	Section 4.0	Section 11.0

1.4 Project Description

1.4.1 The title of the action, background to the action and current status

The solar farm component of the Project is a proposed solar farm which includes construction, operation, maintenance and eventually decommissioning works. The solar farm is proposed to generate approximately 550 MWp (Megawatt peak) of solar electricity, with a Battery Energy Storage System (BESS) of approximately 570 MWh (Megawatt hour) and an electrical substation to connect the solar farm to the existing 500 kV transmission line that runs through the Project Area.

1.4.2 The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES

1.4.2.1 Project Location

The Project is located approximately 28 kilometres (km) southwest of the township of Merriwa and is surrounded by the Goulburn River National Park. It is within the Upper Hunter Local Government Area (LGA) of New South Wales (NSW). The boundary of the Project Area and Development Footprint is shown on the Site Map provided as **Figure 1.1** of the BDAR.

The elevated central parts of the Project Area are located on the Liverpool West Basalt rock unit, with surrounding areas on the Banks Wall Sandstone rock unit, which is part of the Narrabeen Group sandstones (Colquhoun *et al.*, 2021). The areas influenced by the Liverpool West Basalt rock unit are highly productive and have been historically cleared and continue to be utilised for livestock grazing on improved pastures.

The current site vegetation consists of a mosaic of exotic dominated pasture vegetation where pasture improvement has taken place, derived native grasslands subject to various degrees of disturbance in various timeframes, isolated paddock trees, areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

The Project will also require road upgrade works including public road and culvert upgrades on Ringwood Road between Bow River and Killoe Creek. The potential impacts on MNES for this component of the Project is discussed within the Public Road and Culvert Upgrade BDAR in Appendix 7 of the Environmental Impact Statement (EIS).

1.4.2.2 Description of Works

The Development Footprint and Project Area are mapped in **Figure 1.2** of the BDAR. The key components of the Project include:

- Approximately one million bifacial solar PV modules in an east-west single-axis tracking arrangement with an approximate height of 5 metres (m) above ground level.
- A BESS with an approximate 280 MWp and 570 MWh capacity. The BESS will be housed in a series of outdoor containers, either distributed across the site or aggregated in one central location.

- Onsite 500 kV switchyard and substation, with underground electrical conduits and cabling leading into the yard and overhead lines reaching above to the existing transmission line. An additional tower may be erected on the current line to accommodate the grid connection.
- Onsite power line connection via underground electrical conduits and cabling.
- Communications tower, up to 30 m high, providing communications, radio and cellular services to the site and wider region.
- Internal access roads allowing for site maintenance.
- Site office and operations and maintenance building with parking for the operations team.
- Primary solar farm site access point from the existing driveway from Wollara Road, with additional existing access points to be maintained along the north-western boundary of the Project Area.
- Drainage line crossings if and where required to manage existing surface water flows (to be determined during further design development) and access points for construction purposes.
- Security fencing around the main development footprint areas (excluding linking roads /not the entire property), installation of crossing gates, water tanks or dams, and fencing and potential alternate secondary access points to facilitate ongoing livestock grazing.

The Project will also require road and culvert upgrade works on Ringwood Road, between Bow River and Killoe Creek. These repairs will include 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders. The horizontal and vertical alignment of the proposed road will ensure safe sight distance, safe movement of longer vehicles, and an improved road network for the users.

The culvert upgrades are at the locations where Ringwood Road intersects the Bow River and Killoe Creek. The culvert upgrades will include:

- Installing culverts designed to accommodate two-way heavy vehicles, including B doubles and various farm machinery.
- Culvert width 7 m (3.5 m lane width) sealed carriageway with suitable guardrail and signage and associated drainage works.
- Stockpile site to be located on disturbed land within the road reserve in consultation with Upper Hunter Council.
- Temporary side track at both locations to facilitate access during construction.

1.4.3 How the action relates to any other actions that have been, or are being taken in the region affected by the action

Other projects that are or are proposed to be taken within close proximity to the Project site include the Merriwa Solar Farm and the Wollar Solar Farm.

The proposed Merriwa Solar Farm is located within the Merriwa area to the north of the Goulburn River National Park. Detailed impact assessment documentation and biodiversity reporting is currently being prepared and is not available for the Merriwa Solar Farm Project, however preliminary information available indicates that the site contains suitable habitat for the Regent Honeyeater and the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community listed under the EPBC Act.

The Wollar Solar Farm is located to the south-west of the Project Area at Tichular and is an approved project. Impact assessment documentation for the Wollar Solar Farm identifies impacts and offsetting to the following MNES also proposed to be impacted and offset by the Goulburn River Solar Farm:

- Regent Honeyeater (25.66 ha of suitable foraging habitat).
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland (232 ha including 29 ha of woodland and 203 hectares of derived native grassland).

1.4.4 How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES

The following design considerations have factored into the selection of the Development Footprint and biodiversity impact avoidance:

- The Project Area was selected for the location of a solar farm due to the presence of an existing 500 kv transmission line, which means that there will be no requirement for a new electricity transmission line or associated impacts. To ensure that the project remains economically viable the total capacity of solar production needs to remain at or above a 550 MWp of solar electricity.
- The Project Area is also characterised by suitable terrain and topography, high quality solar irradiance and ideal climatic conditions, access to major transport networks for delivery of construction materials. There is only one surrounding land holder (the NSW Government) and the visual impacts associated with the Project can be managed through the screening provided by the Goulburn River National Park.
- The Project Area (2000 hectares (ha)) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Throughout the EIS preparation and scoping phases of the Project several design refinements have occurred including:

- Biodiversity impact avoidance through an initial approximately 30% reduction in development footprint area (reducing from 1,249 ha to 882 ha) and a further secondary approximately 10% reduction in development footprint (882 ha to 799.5 ha).
- Selection of higher rated capacity solar panels to ensure that the development footprint is minimised, the project obtains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the projects economic viability.

- Optimising opportunities to maintain connectivity between the Project Area and surrounding Goulburn River National Park and within the Project Area through limiting fencing to strategic areas.
- Redesign the Project to minimise impacts on areas of mapped Regent Honeyeater (*Anthochaera phrygia*) important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to avoid impact to Plant Community Types (PCTs) associated with habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*).
- Reduction in the area occupied by the Project for the White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC) to avoid areas of woodland with intact crown condition, and impact minimisation to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area.

2.0 Methods

The information outlined in this report is based on the results of both a desktop-based literature and database review and comprehensive biodiversity surveys undertaken over multiple years and seasons. The surveys were undertaken in accordance with the BAM and are documented in the BDAR prepared for the solar farm component of the Project. While it is acknowledged that this methodology is endorsed by the Commonwealth under the Assessment Bilateral Agreement, Umwelt has also sought to refer to the Commonwealth survey guidelines where relevant.

2.1 Desktop Literature and Database Review

The following key information sources containing existing ecological information related to the site have been reviewed as part of the preparation of this report:

- Biodiversity Assessment Methodology 2020 (DPIE 2020a).
- NSW BioNet (incorporating the BioNet Atlas and Threatened Species Data Collection (TBDC)) (DPE 2022a), accessed March 2023.
- NSW Department of Planning and Environment (DPE) BAM Important Areas viewer (DPE 2022b), accessible through the Biodiversity Offsets and Agreement Management System (BOAMS) portal, accessed March 2023.
- BioNet Vegetation Classification Database (DPE 2022c), accessed March 2023.
- Protected Matters Search Tool (PMST) (DCCEEW 2023b) for known/predicted EPBC Act-listed threatened and migratory species, as well as threatened ecological communities (TECs), accessed March 2023.
- National Flying Fox Monitoring Viewer (DCCEEW 2023c) - <https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>, accessed March 2023.

These reports and databases were reviewed to obtain information in relation to the PCTs, habitat constraints, microhabitats and previous site records for threatened species. A likelihood of occurrence assessment was completed for the nationally listed threatened species, migratory species and threatened ecological communities identified from the PMST (DAWE 2022c) using the definitions provided in **Table 2.1**. The results of this assessment are provided in **Section 3.0**.

2.2 MNES Likelihood of Occurrence Assessment

A likelihood of occurrence assessment has been undertaken in **Table 2.1** for MNES identified from the Biodiversity Assessment Method Calculator (BAM-C), from a 10 km radius search of the BioNet Atlas and from a 10 km PMST search. The assessment has been undertaken utilising the following likelihood of occurrence ratings and definitions:

- **Know Occurrence** – Recent and reliable records of this matter exist within the Project Area.
- **High Likelihood of Occurrence** – Probable that the matter occurs in the Project Area, despite lack of records.
- **Moderate Likelihood of Occurrence** – Suitable habitat is present for this matter however records of the matter are not known to occur in the immediate locality of the Project Area.
- **Low Likelihood of Occurrence** – There are no records for this matter, habitat requirements are not met, or the normal distribution range of the matter does not coincide with the Project Area locality. Despite this, the matter may be present in rare circumstances.
- **Not Likely to Occur** – The matter is not likely to occur within the locality of the Project Area.

Those matters identified in **Table 2.1** has having a known occurrence or a high or medium likelihood of occurrence in the Project Area are assessed further in **Section 4.2** of this Report.

Table 2.1 MNES Likelihood of Occurrence Assessment

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Wetlands of International Importance (RAMSAR Wetlands)					
Hunter Estuary Wetlands	-	Ramsar	Ramsar Wetlands - within 100–150 km of Ramsar site	Not present – Hunter Estuary Wetland Areas occur approximately 100–150 km upstream of the Project Area. Disturbances in the Project Area are not expected to have any direct or indirect impact on the Hunter Estuary Wetlands Ramsar Site.	No
Threatened Ecological Communities					
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Central Hunter Valley eucalypt forest and woodland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South--eastern Australia	-	E	MNES Search (likely presence)	Not present – ecological community not observed during surveys.	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Hunter Valley Weeping Myall (<i>Acacia pendula</i>) Woodland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	-	CE	MNES Search (likely presence)	Observed during surveys. Associated with areas of PCT 483 which meet condition threshold requirements.	Yes
Weeping Myall Woodlands	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Threatened Flora Species					
<i>Androcalva procumbens</i>	V	V	MNES Search (likely presence)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Androcalva rosea</i> (syn. <i>Commersonia rosea</i>) Sandy Hollow Commersonia	E	E	BioNet Atlas, MNES Search (known presence)	Moderate to Low. Recorded adjacent to Project Area on western side of Wollara Road, however habitats within the Project Area are significantly more disturbed.	Yes
<i>Dichanthium setosum</i> Bluegrass	V	V	BioNet Atlas, MNES Search (likely presence)	Moderate to Low. Denatured records mapped mostly south of the Goulburn River. Associated with PCT 483. Not predicted to occur according to the BAM-C for the solar farm project area. It is predicted in BAM-C for the road upgrade area. The Solar Farm Project Area is located within the Sydney Basin Bioregion, this species is not known or predicted to occur within the Sydney Basin Bioregion.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Euphrasia arguta</i>	CE	CE	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Homoranthus darwinioides</i> Fairy Bells	V	V	BioNet Atlas, MNES Search (known)	Moderate. Recorded at several locations in adjoining sandstone areas of the Goulburn River National Park, however habitats within the Project Area are significantly more disturbed.	Yes
<i>Lepidium aschersonii</i> Spiny peppergrass	V	V	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Ozothamnus tessellatus</i>	V	V	BioNet Atlas, MNES Search (likely presence)	Moderate. Known to occur within the locality mostly south of the Goulburn River.	Yes
<i>Persoonia hirsuta</i>	E	E	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
<i>Prasophyllum sp. Wybong</i> (<i>C. Phelps</i> ORG 5269)	-	CE	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
<i>Prostanthera discolor</i>	V	V	MNES Search (likely presence)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
<i>Thesium australe</i>	V	V	MNES Search (likely presence)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
<i>Tylophora linearis</i>	V	E	BioNet Atlas, MNES Search (may occur)	Unlikely. Local records are south of the Goulburn River and not predicted to occur within BAM-C.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Threatened Fauna Species					
<i>Anthochaera phrygia</i> Regent Honeyeater	CE	CE	BioNet Atlas, MNES Search (known presence)	Foraging habitat use: high , Breeding habitat use: low Site mapped as important habitat.	Yes
<i>Aphelocephala leucopsis</i> Southern Whiteface*	V	V	MNES Search (known presence)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	V	V	BioNet Atlas, MNES Search (known presence)	Moderate. Recorded in 2000 approximately 7 km to the west of the Solar Farm Project Area. Associated in BAM-C with PCT 483.	Yes
<i>Botaurus poiciloptilus</i> Australasian Bittern	E	E	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Calidris ferruginea</i> Curlew Sandpiper	E	CE, M	MNES Search (may occur)	Unlikely. No known records within 10 km of the Project Area. No habitat within the Project Area.	No
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo*	V	E	BioNet Atlas, MNES Search (known presence)	Moderate. Recorded within the locality of the Solar Farm Project Area.	Yes
<i>Calyptorhynchus lathami</i> South Eastern Glossy Black-Cockatoo*	V	V	BioNet Atlas, MNES Search (known presence)	Known. Observed during surveys for the Solar Farm Project Area.	Yes
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V	BioNet Atlas, MNES Search (known presence)	High. Recorded within the locality of the Solar Farm Project Area.	Yes
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (south-eastern)*	V	V	MNES Search (known presence)	High. Recorded within the locality of the Solar Farm Project Area. Associated in BAM-C with PCT 1661.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V	E	BioNet Atlas, MNES Search (known presence)	Low. Single record south of Goulburn River. Associated in BAM-C with PCT 1661.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .
<i>Delma impar</i> Striped Legless Lizard	V	V	MNES Search (likely presence)	Low. No records within the locality of the Project Area. Associated with in BAM-C with PCT 483. Previously confused with the recently described Hunter Valley Delma (<i>Delma vescolineata</i>).	No
<i>Falco hypoleucos</i> Grey Falcon	V	V	MNES Search (likely presence)	Low. No records within the locality of the Project Area. Considered unlikely to occur within the Project Area.	No
<i>Grantiella picta</i> Painted Honeyeater	V	V	BioNet Atlas, MNES Search (known presence)	High. Recorded within the locality of the Solar Farm Project Area. Associated in BAM-C with PCT 483.	Yes
<i>Heleioporus australiacus</i> Giant Burrowing Frog	V	V	MNES Search (may occur)	Unlikely. No records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Hirundapus caudacutus</i> White-throated Needletail	-	V,M	BioNet Atlas, MNES Search (known presence)	Known. Observed during surveys. Associated in BAM-C with PCT 483 and PCT 1661.	Yes
<i>Lathamus discolor</i> Swift Parrot	E	CE	BioNet Atlas, MNES Search (likely presence)	Moderate to Low. Suitable foraging habitat present, low number of local records. Potential for sporadic annual occurrence.	Yes
<i>Leipoa ocellata</i> Malleefowl	E	V	BioNet Atlas, MNES Search (likely presence)	Unlikely. Recorded within the locality of the solar farm. No habitat within the Project Area.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Litoria booroolongensis</i> Booroolong Frog	E	E	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Melanodryas cucullata cucullata</i> South-eastern Hooded Robin*	V	E	BioNet Atlas, MNES Search (known presence)	Moderate. Recorded adjacent to the Project Area/solar farm. Associated with PCT 1661.	Yes
<i>Neophema chrystoma</i> Blue-winged Parrot*	-	V	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Numenius madagascariensis</i> Eastern Curlew	-	CE	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	V	V	BioNet Atlas, MNES Search (known presence)	Moderate. Recorded within the locality of the solar farm.	No
<i>Petauroides volans</i> Greater Glider (southern and central)*	E	E	MNES Search (known presence)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .
<i>Petaurus australis australis</i> Yellow-bellied Glider (south-eastern)	V	V	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	E	V	BioNet Atlas, MNES Search (known presence)	Low. Recorded within the locality of the solar farm. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .
<i>Phascolarctos cinereus</i> Koala	E	E	BioNet Atlas, MNES Search (known presence)	Low. Record marked on site from 1957 with questionable locational accuracy. Recent call, scat and scratching records made 5 km SW on alluvial flats associated with the Goulburn River. Associated with PCT 483 and PCT 1661.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .
<i>Polytelis swainsonii</i> Superb Parrot	V	V	MNES Search (may occur)	Low. No known records within the locality of the Project Area.	No
<i>Pseudomys novaehollandiae</i> New Holland Mouse	-	V	MNES Search (known presence)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	MNES Search (may occur)	Low. No known records within the locality of the Project Area. The closest known flying-fox camp is located at Muswellbrook.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in Section 4.0 .

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Pycnoptilus floccosus</i> Pilotbird	-	V	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Rostratula australis</i> Australian Painted Snipe	E	E	MNES Search (likely presence)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Stagonopleura guttata</i> Diamond Firetail	V	V	MNES Search (known presence)	Known. Observed during surveys.	Yes
Migratory Species					
<i>Actitis hypoleucos</i> Common Sandpiper		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Apus pacificus</i> Fork-tailed Swift		M	MNES Search (likely presence)	Moderate. No known records within the locality of the Project Area. Project Suitable habitat is present.	No
<i>Calidris acuminata</i> Sharp-tailed Sandpiper		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Calidris ferruginea</i> Curlew Sandpiper		CE	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Calidris melanotos</i> Pectoral Sandpiper		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Gallinago hardwickii</i> Latham's Snipe		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Hirundapus caudacutus</i> White-throated Needletail		V	MNES Search (known presence)	Known. Observed during surveys. Associated in BAM-C with PCT 483 and PCT 1661.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
<i>Monarcha melanopsis</i> Black-faced Monarch		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Motacilla flava</i> Yellow Wagtail		M	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Myiagra cyanoleuca</i> Satin Flycatcher		M	MNES Search (likely presence)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Numenius madagascariensis</i> Eastern Curlew	-	CE	MNES Search (may occur)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
<i>Rhipidura rufifrons</i> Rufous Fantail		M	MNES Search (known presence)	Unlikely. No known records within the locality of the Project Area. No habitat within the Project Area.	No
KEY * = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act. V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory					

2.3 Field Surveys

2.3.1 Plant Community Type Mapping

The native vegetation extent within the Development Footprint was determined during site surveys, through Geographic Information Systems (GIS) mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and PCT mapping was undertaken using best-practice techniques to delineate vegetation communities across the Development Footprint. Vegetation mapping involved the following key steps:

- review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography
- review of the modelled distribution of vegetation communities within broader scale regional based vegetation mapping
- preparation of a draft plant community type map based on interpretation of digital aerial imagery
- field-based ground-truthing of the draft plant community type mapping
- confirmation of vegetation community floristic delineations based on plot data.

PCT were delineated through the identification of patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other communities.

2.3.2 Plant Community and Threatened Ecological Community Surveys

Comprehensive plant community surveys have been undertaken, as documented in the BDAR. A stratified plot-based floristic and vegetation integrity of the Development Footprint was undertaken in accordance with Table 3 and Section 4.2.1 of the BAM, to assess the expected environmental variation and address any gaps and verify the results of previous mapping and site information.

The BAM plots were sampled by Umwelt ecologists on the following dates:

- 3 February 2022
- 21–25 March 2022
- 5–7 April 2022
- 15–16 June 2022
- 30 January–2 February 2023
- BAM plot survey stratification for each plant community type is listed in **Table 2.1**.

Table 2.2 Plant Community Type Survey Plot Stratification Details

PCT ID	PCT Name	Vegetation Condition Zone	Area (ha)	Quantity of Plots Required (BAM 2020 Table 3)	Plots Completed
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered Trees	23.69	4	4
		Moderate Condition Derived Native Grassland	166.69	6	18
		Moderate to Low Condition Derived Native Grassland	310.28	7	19
		Low Condition Derived Native Grassland	199.09	6	10
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07	3	4
		Moderate to Low Condition Derived Native Grassland	36.79	4	10
		Low Condition Derived Native Grassland	53.24	5	5

The PCT_s mapped within the Project Area were compared to TECs listed under the EPBC Act using the Commonwealth Threatened Species Scientific Committee (TSSC) listing and conservation advice and/or policy statements. The following approach was used:

- A list of nationally listed TECs potentially occurring within the Project Area was obtained through the completion of a PMST search using a 10 km buffer and review of the EPBC Act List of TECs.
- Full-floristic plot assessment, rapid assessments and meandering surveys were completed to determine floristic composition and structure of each PCT.
- For TECs with a potential occurrence within the Project Area, the TEC diagnostic characteristics and condition thresholds were analysed, as identified in the listing advice provided by the TSSC for the relevant candidate TECs assessed.
- Comparison was undertaken with published species lists, including lists of ‘important species’ as identified on the listing advice provided by the TSSC for potentially occurring nationally listed TECs.
- Comparison with habitat descriptions and distributions for potentially occurring nationally listed TECs was made.

Assessments were completed for the nationally listed TECs potentially occurring using any relevant guidelines and recovery plans published by the Commonwealth.

2.3.3 EPBC Act Listed Threatened Species Surveys

Biodiversity surveys have been undertaken by Umwelt in the Project Area between 2017 and 2022.

The following guidelines relevant to the BAM were utilised for the completion of habitat assessments and targeted surveys for candidate threatened and migratory listed species:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004).
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (DPIE 2020b).
- Flora Species with Specific Survey Requirements List Version 1.
- ‘Species Credit’ Threatened Bats and their Habitats – NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018).
- Bat Calls of NSW – Region Based Guide to the echolocation calls of microchiropteran bats (Pennay *et al.*, 2004).
- NSW Survey Guide for Threatened Frogs – A guide for the survey and assessment of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020c).
- Survey Guidelines for Australia’s Threatened Mammals: Guidelines for Detecting Mammals Listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia (DSEWPC 2011).
- Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act. Canberra: Department of Environment, Water, Heritage and the Arts (DEWHA 2010a).
- Survey Guidelines for Australia’s Threatened Birds: Guidelines for Detecting Birds Listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia (DEWHA 2010b).

The locations of surveys completed for all EPBC Act listed species are documented in the BDAR prepared for the Project.

Surveys were undertaken for the threatened species considered to have potential to occur in the Project Area based on database reviews, including the EPBC Act PMST (DCCEEW 2023b) and NSW BioNet Atlas (DPE 2022a). Surveys included species-specific surveys and on-ground searches in suitable habitat throughout the Project Area. Additionally, opportunistic surveys were undertaken for these species in conjunction with the plant community surveys undertaken.

Targeted surveys for EPBC Act listed species-credit, ecosystem-credit and dual-credit species were undertaken over the dates provided in **Table 2.2** and **Table 2.3**.

Table 2.3 Surveys Targeting Threatened EPBC Act Listed Flora Species

Scientific Name	Common Name	Listing Status		Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act		
<i>Androcalva rosea</i> (syn. <i>Commersonia rosea</i>)	Sandy Hollow Commersonia	E	E	<ul style="list-style-type: none"> 10 m parallel traverse. Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys. 	<ul style="list-style-type: none"> Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). NSW TBDC (DPE 2022d).
<i>Dichanthium setosum</i>	Bluegrass	V	V	<ul style="list-style-type: none"> 10 m parallel traverse. Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys. 	<ul style="list-style-type: none"> Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). NSW TBDC (DPE 2022d).
<i>Homoranthus darwinioides</i>	Fairy Bells	V	V	<ul style="list-style-type: none"> 10 m parallel traverse. Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys. 	<ul style="list-style-type: none"> Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). NSW TBDC (DPE 2022d).
<i>Ozothamnus tessellatus</i>		V	V	<ul style="list-style-type: none"> 20 m parallel traverse. Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys. 	<ul style="list-style-type: none"> Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). NSW TBDC (DPE 2022d).
<p>Key V = Vulnerable, E = Endangered, CE = Critically Endangered.</p>					

Table 2.4 Surveys Targeting Threatened and Migratory EPBC Act Listed Fauna Species

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Dual	This species is assumed to be present based on the presence of mapped important habitat within the Development Footprint.	<ul style="list-style-type: none"> • Survey guidelines for Australia’s threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> ○ Area searches for 20 hours for 10 days (in areas < 50 ha). ○ Targeted searches for 20 hours for 5 days (targeting areas of heavily flowering trees and flocks of other blossom feeders). • NSW TBDC (DPE 2022a). • Important habitat mapping for regent honeyeater (DPE).
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V	V	Species	Reptile rock-rolling searches	<ul style="list-style-type: none"> • Survey guidelines for Australia’s threatened reptiles (DSEWPC 2011b). <ul style="list-style-type: none"> ○ Searches restricted to an area of relatively homogeneous habitat within each site and a search beneath all rocks that can be turned is made. ○ Rock cover density rather than fixed area size determines a plot, and 150–200 rocks need to be turned to be reasonably confident of determining the species’ presence. ○ Search success appears to be highest in spring and early summer on warm but not hot days, after a period of rainfall extending over several days. ○ During summer months surveys are carried out in the mornings or on cloudy days when soil temperatures beneath the rocks are not too high. ○ During late autumn and winter surveys are carried out on clear sunny days as warming of the rocks appears to attract individuals to the soil surface beneath the rocks. • NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
<i>Callocephalon fimbriatum</i> *	Gang-gang Cockatoo	V	E	Dual	Diurnal census Avifauna breeding activity, stick nest and tree hollow search Opportunistic observation of avifauna breeding activity	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> No specific EPBC guidelines available so survey effort was as per the requirements for the Glossy Black-Cockatoo. NSW TBDC (DPE 2022a).
<i>Calyptorhynchus lathami</i> *	Glossy Black-Cockatoo	V	V	Dual	Diurnal census Avifauna breeding activity, stick nest and tree hollow search Opportunistic observation	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> Land-based area searches for 5 hours for 1 day. Targeted searches for 20 hours for 4 days (search for signs of feeding or nests). NSW TBDC (DPE 2022a).
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Species	Ultrasonic microbat call detection (Anabat)	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened mammals (DSEWPC 2011a). <ul style="list-style-type: none"> A combination of techniques is recommended: <ul style="list-style-type: none"> Unattended bat detectors for total of 16 detector nights at a minimum of 4 nights (area < 50 ha). Attended bat detectors for total of 6 detector nights for minimum of 3 nights (area < 50 ha). Harp traps and/or mistnets total efforts of 16 trap or net nights with minimum of 4 nights (area < 50 ha). NSW TBDC (DPE 2022a).
<i>Climacteris picumnus victoriae</i> *	Brown Treecreeper (south-eastern)	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> No relevant EPBC Act Survey guidelines have been prepared. NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
<i>Delma impar</i>	Striped Legless Lizard	V	V	Species	Reptile rock-rolling searches	<ul style="list-style-type: none"> • Survey guidelines for Australia’s threatened reptiles (DSEWPC 2011b). <ul style="list-style-type: none"> ○ Surveys primarily undertaken during the active period of the species (between September and May). Some survey techniques (such as active searching) may be undertaken during the cooler months of the year, but often with less success. ○ In areas with surface rock, artificial shelter site surveys or rock turning should be the primary technique (with supplementary techniques employed as appropriate). ○ In areas with little to no rocky habitat (such as the ACT), artificial shelter site surveys or pitfall trapping should be used in conjunction with hand searches around tussocks.
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	<ul style="list-style-type: none"> • Survey guidelines for Australia’s threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> ○ No relevant EPBC Act Survey guidelines have been prepared. • NSW TBDC (DPE 2022a).
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	<ul style="list-style-type: none"> • Survey guidelines for Australia’s threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> ○ No relevant EPBC Act Survey guidelines have been prepared. ○ The species is a trans-equatorial migrant, breeding in the Northern Hemisphere and flying south for the boreal winter. Identify presence in Australia between late October to April as noted in the Conservation Advice (TSSC 2019). • NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Dual	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species and species credit component assessed by important habitat mapping which does not occur within the Project Area.	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> Area searches or transect surveys for 20 hours for 8 days (in reas < 50 ha). Targeted surveys for 20 hours for 8 days (targeting areas of heavily flowering eucalypts). NSW TBDC (DPE 2022a). Important habitat mapping for swift parrot (DPE).
<i>Melanodryas cucullata cucullata*</i>	South-eastern Hooded Robin	V	E	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> No relevant EPBC Act Survey guidelines have been prepared. NSW TBDC (DPE 2022a).
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Ecosystem	No surveys required (ecosystem credit species)	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened bats (DEWHA 2010). <ul style="list-style-type: none"> harp traps mistnets ecolocation call detectors combined efforts. NSW Threatened Biodiversity Data Collection (TBDC) (DPE 2022a).
<i>Stagonopleura guttata*</i>	Diamond Firetail	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	<ul style="list-style-type: none"> Survey guidelines for Australia's threatened birds (DEWHA 2010b). <ul style="list-style-type: none"> No relevant EPBC Act Survey guidelines have been prepared. NSW TBDC (DPE 2022a).

KEY

* = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act.

V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory.

3.0 Survey Results

3.1 Plant Community Types and Threatened Ecological Communities

The PCTs identified in this assessment are based on the PCTs available prior to the release of the revised PCTs for eastern NSW and associated update to the BAM Calculator which occurred in February 2023. In-progress BAM-C assessments and projects with substantially progressed surveys are able to undertake this approach, in accordance with the transitional arrangements.

Vegetation within the Development Footprint has been assessed as aligning with the PCTs identified within **Table 3.1**. The extent of these PCTs is mapped in **Figure 4.2** of the Solar Farm BDAR. Detailed descriptions for each PCT are provided within the BDAR.

Table 3.1 Plant Community Types and TEC Associations

Current BAM-C PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Condition Zone and Area within Solar Farm Footprint (ha)	Condition Zone and Area within Roadworks Footprint (ha)	EPBC TEC Associations
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Western Slopes Grassy Woodlands	Grassy Woodlands	Scattered Trees: Total Area = 23.64 EPBC Act CEEC Component = 19.26 ha	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (In part = 19.26 ha)
				Moderate Condition Derived Native Grassland: 168.48	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
				Moderate to Low Condition Derived Native Grassland: 308.37	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
				Low Condition Derived Native Grassland: 199.14	N/A	Does not meet condition thresholds for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Scattered Trees: 6.07	N/A	Does not correspond to any listed EPBC Act TEC
				Moderate to Low Condition Derived Native Grassland: 36.79	N/A	Does not correspond to any listed EPBC Act TEC
				Low Condition Derived Native Grassland: 53.24	N/A	Does not correspond to any listed EPBC Act TEC

3.2 Threatened Ecological Community Considerations

One nationally listed TEC, the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, occurs within the Project Area. This CEEC corresponds to the Areas of PCT 483, excluding derived native grassland areas mapped as Low Condition and the areas of Scattered Trees surrounded by areas mapped as Low Condition derived native grassland.

3.3 Threatened Flora Species

No threatened flora species listed under the EPBC Act have been observed within the Project Area.

3.4 Threatened Fauna Species

3.4.1 Species Credit Fauna Species Observed

The following EPBC Act-listed threatened species have been recorded in the Project Area and surrounds. The locations of the species credit species recorded within the Project Area is shown in Figure 5.3 of the BDAR:

- Diamond Firetail (*Stagonopleura guttata*): This species was observed within the Development Footprint at several locations as shown in the BDAR. The observation dates were 24 August 2021, 23 November 2021, 2 February 2022 and 22 March 2022.
- White-throated Needletail (*Hirundapus caudacutus*): This species was recorded during surveys on 23 November 2022 (8 individuals observed) and on 1 February 2022 (3 individuals observed). The entire area of the Development Footprint is considered to provide suitable aerial foraging habitat for this species.
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*): This species was heard calling to the south-west of the Development Footprint on 14 October 2021 and was observed in the north-eastern part of the Development Footprint in two locations on 31 January 2022. The behaviours observed were consistent with foraging and no use of the site for breeding habitat was observed despite targeted survey in the breeding season.

3.4.2 Mapped Important Habitat Species

3.4.2.1 Regent Honeyeater (*Anthochaera phrygia*)

This species is assumed to be present based on the presence of mapped important habitat within the Development Footprint. The extent of mapped important habitat within the Development Footprint is 45.09 ha.

4.0 MNES Impact Assessment

4.1 Determination of MNES Likely to be Impacted by the Project

The EPBC Act Listed Matters which are known to occur or have a medium to high potential to occur within the Project Area are listed in **Table 4.1**. This Table provides an assessment to determine which of these MNES are likely to be impacted by the Project. For species and communities potentially located in the Project Area or in the vicinity that are not likely to be impacted, additional evidence of why they are not likely to be impacted is provided. Additional MNES entities identified as priority management species following the 2019–2020 bushfires in the supplementary SEARs have also been identified for further assessment.

Table 4.1 Determination of MNES Likely to be Impacted by the Project

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
White Box – Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered Ecological Community	Yes / Observed	Present.	Associated PCT removal.	Scattered trees condition zone = 19.26 ha. Derived native grassland moderate condition zone = 168.48 ha. Derived native grassland moderate to low condition zone = 308.37 ha.	Loss of habitat.	Yes.
Sandy Hollow Commersonia (<i>Androcalva rosea</i> (syn. <i>Commersonia rosea</i>))	Endangered	Not observed during surveys, not likely to occur	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Bluegrass (<i>Dichanthium setosum</i>)	Vulnerable	–Not observed during surveys, not likely to occur	Not likely to occur / Not known from the Sydney Basin Bioregion or predicted to occur in BAM-C for solar farm Project Area. Not observed during targeted surveys for Road Works Project Area.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Fairy Bells (<i>Homoranthus darwinioides</i>)	Vulnerable	Not observed during surveys, not likely to occur.	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
<i>Ozothamnus tessellatus</i>	Vulnerable	Not observed during surveys, not likely to occur.	Low.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Regent Honeyeater (<i>Anthochaera phrygia</i>)	Critically Endangered	Site mapped as important habitat, moderate likelihood of occurrence.	High.	Mapped Important Habitat Removal.	45.09 ha of mapped important habitat.	Loss of potential degraded suitable foraging habitat. Species has not been recorded within the Project Area during surveys.	Yes.
Southern Whiteface (<i>Aphelocephala leucopsis</i>)*	Vulnerable	Not observed during surveys. High potential for occurrence.	High.	Removal of suitable habitat.	Species not associated with any PCTs in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss and modification of suitable habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Pink-tailed Legless Lizard (<i>Aprasia parapulchella</i>)	Vulnerable	Not observed during surveys, not likely to occur.	Low.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Gang-gang Cockatoo (<i>Callocephalon fimbriatum</i>)*	Endangered	Not observed during surveys, not likely to occur.	Species not observed during surveys, no impacts likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)*	Vulnerable	Observed during surveys. Potential to utilise scattered occurrences of <i>Allocasuarina luehmannii</i> trees as foraging habitat. There are present in low densities in PCT 1661.	Moderate.	Removal of suitable foraging habitat.	Removal of scattered <i>Allocasuarina luehmannii</i> trees within the Project Area. Species is associated with PCT 483 and PCT 1661. Impacts across the Development Footprint will include removal of 23.64 ha of PCT 483 scattered trees condition zone and 6.07 ha of PCT 1661, scattered trees condition zone.	Loss of potential foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	Vulnerable	Assumed presence, high likelihood of occurrence limited to use of Project Area as foraging habitat	Moderate.	No PCTs associated with this species will be impacted.	No PCTs associated with this species will be impacted.	Modification of areas of suitable aerial foraging habitat.	Yes.
Brown Treecreeper (south-eastern) (<i>Climacteris picumnus victoriae</i>)*	Vulnerable	Assumed presence. High likelihood of occurrence.	High.	Modification of foraging habitat.	Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Modification of areas of suitable aerial foraging habitat.	Yes.
Spotted-tailed Quoll (<i>Dasyurus maculatus maculatus</i>) (South-east mainland Population)	Endangered	Not observed / Assessed as ecosystem credit entity with assumed presence	Low.	Modification of movement habitat used for landscape connectivity.	Reduction in areas available for movement through the Project Area and loss in area of highly disturbed foraging habitat. Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Reduced opportunities for movement through the Project Area, species likely to persist if present within the Project Area and locality due to retention of linkage corridors and areas of highest quality suitable habitat.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Painted Honeyeater (<i>Grantiella picta</i>)	Vulnerable	Assumed presence. High likelihood of occurrence.	Moderate.	Removal of habitat.	Species associated with PCT 483 of which 699.6 ha will be impacted, including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones.	Loss of potential degraded suitable foraging habitat. Species has not been recorded within the Project Area during surveys.	Yes
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Vulnerable	Observed during surveys. Known to occur.	Moderate.	Modification of aerial foraging habitat and removal of potential low quality roost habitat.	Species is associated with PCT 483 and PCT 1661 in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of potential degraded suitable foraging habitat. Species has been recorded within the Project Area during surveys.	Yes.
Swift Parrot (<i>Lathamus discolor</i>)	Critically Endangered	Moderate. Not observed. Assessed as ecosystem credit species with assumed presence.	Low to moderate.	Direct removal of suitable foraging habitat.	No mapped important habitat will be impacted.	Loss of suitable foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
					Species is associated with PCT 483 and PCT 1661 in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.		
South-eastern Hooded Robin (<i>Melanodryas cucullata cucullata</i>)*	Endangered	Assessed as ecosystem credit species with assumed presence. Likely to occur.	High.	Direct removal of suitable foraging habitat.	Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of suitable foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Diamond Firetail (<i>Stagonopleura guttata</i>)*	Vulnerable	Observed. Know to occur.	Medium.	Removal of habitat.	Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of known habitat.	Yes.
Koala (combined populations of QLD, NSW, ACT) (<i>Phascolarctos cinereus</i>)	Endangered	Not observed	Low / Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment completed.
Greater Glider (<i>Petauroides volans</i>)*	Vulnerable	Not observed	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Brush-tailed Rock Wallaby (<i>Petrogale penicillata</i>)	Vulnerable	Not observed	Not likely to occur, no suitable habitat present.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.
New Holland Mouse (<i>Pseudomys novaehollandiae</i>)	Vulnerable	No suitable habitat present, not likely to occur	Not impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>)	Vulnerable	Not observed / foraging habitat assessed as ecosystem credit entity	Medium.	Removal of habitat.	Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of known habitat.	Yes.
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Vulnerable	Not observed / foraging habitat assessed as ecosystem credit entity	Low, nearest camp site is in Mudgee.	Direct removal of suitable foraging habitat.	Species is associated with PCT 483 and PCT 1661. Impacts across the Development Footprint will include removal of 23.64 ha of PCT 483 scattered trees condition zone and 6.07 ha of PCT 1661, scattered trees condition zone.	Loss of suitable foraging habitat in an area which is not in proximity to any known camps.	Significant Impact Assessment completed.

KEY

* = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act.

4.2 EPBC Act Significant Impact Assessments

Significant impact assessments have been provided for the following nationally listed threatened species and ecological communities that are likely to be impacted by the Project, in accordance with the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DOE 2013) for the EPBC Act:

- White Box – Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland
- Regent Honeyeater (*Anthochaera phrygia*)
- South-eastern Hooded Robin (*Melanodryas cucullata cucullata*)
- Swift Parrot (*Lathamus discolor*)
- Koala (*Phascolarctos cinereus*) (combined populations of QLD, NSW, ACT)
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) (South-east mainland Population)
- Painted Honeyeater (*Grantiella picta*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Diamond Firetail (*Stagonopleura guttata*)
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)
- Southern Whiteface (*Aphelocephala leucopsis*)
- Corben’s Long-eared Bat (*Nyctophilus corbeni*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

These species were identified in **Table 4.1** as having potential to be impacted by the Project.

4.2.1 White Box - Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland

4.2.1.1 Significant Impact Assessment

White Box – Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland is listed as a CEEC under the EPBC Act. The Significant impact assessment criteria for CEEC are listed below in bold font and specifically addressed for this ecological community.

- **reduce the extent of an ecological community**

The Project will reduce the extent of the ecological community through the removal of areas of PCT 483 Grey Box X White Box grassy open woodland on basalt hills in the Merriwa Region Upper Hunter Valley, including areas of the derived native grassland and scattered trees condition zones within the Development Footprint.

- **fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines**

The Project will increase the fragmentation of the ecological community which occurs within the Project Area. Project design measures have been implemented to minimise the extent to which fragmentation which will occur.

- **adversely affect habitat critical to the survival of an ecological community**

The primary land use undertaken on the Development Footprint is agriculture. Due to the high levels of degradation from the ongoing agricultural use of the Development Footprint, and the avoidance of areas of moderate to good quality habitat for this CEEC, it is considered that habitat to be impacted is not critical to the survival of the ecological community.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

Impacts within the Solar Farm project area will result in the alteration of surface water drainage patterns, however the impacts will be limited to first and second order streams. There is only one third order stream within the Development Footprint, Redlynch Creek. While Redlynch Creek is within the Development Footprint, much of this creek occurs within the proposed exclusion zone.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The construction of the proposed solar farm will require the removal of scattered trees and result in impacts to areas of derived native grasslands. The grassland areas to be impacted have been assessed as likely to be completely removed, however there is potential that these areas may regenerate as native grasslands and persist under the panels which are proposed to be installed. Changes in species composition and loss of functionally important species has potential to occur within the Development Footprint.

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

- **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**

Management of invasive species would occur as part of the Project and fertilizer, herbicide and chemical use would be carefully controlled to ensure no impacts to areas of retained vegetation.

- **interfere with the recovery of an ecological community.**

The primary land use undertaken on the Development Footprint is agriculture. This land use has resulted in the ongoing degradation of the habitats present. It is considered that the Development Footprint is not an area likely to be prioritized for the recovery of this ecological community due to its importance as agricultural land. The Project will further reduce the potential for the recovery of the ecological community within the Development Footprint, however it is considered that if the status quo is maintained the Development Footprint is not likely to be an area for the recovery of the ecological community.

4.2.1.2 Impact Avoidance Measures

The Project has been designed to avoid impacts to areas of this CEEC which are in moderate to good condition. The Project has been designed to encompass the most disturbed areas of the site where the condition thresholds for this CEEC are not met and where lower condition states such as derived native grassland or scattered trees are present.

4.2.1.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a Construction Environmental Management Plan (CEMP) incorporating appropriate monitoring and adaptive management strategies.

4.2.1.4 Impacts of the 2019–2020 bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event. Large areas of other connected National Parks and private properties along the Great Dividing Range were also impacted by this fire event.

This threatened ecological community predominantly occurs in areas on the western slopes and tablelands from Southern Queensland, through NSW and central Victoria in areas which were not impacted by the 2019–2020 bushfires.

4.2.1.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project will have a significant impact on the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

The proponent has committed to undertaking investigations into the use of the residual areas of the Development Footprint as a Biodiversity Stewardship Site to generate biodiversity credits which would directly offset impacts to this listed CEEC. Residual credit requirements would be sourced in accordance with the like-for-like requirements and would include measures such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.2 Regent Honeyeater (*Anthochaera phrygia*)

4.2.2.1 Significant Impact Assessment

The Regent Honeyeater is listed as critically endangered under the EPBC Act. The significant impact assessment criteria for critically endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

This species has not been observed within the Development Footprint and is not likely to be directly impacted by the Project. The areas of mapped important habitat for this species have been mapped based on buffers to known breeding sites located in adjoining areas, including the Goulburn River National Park.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of a population of the Regent Honeyeater.

This species has been recorded at three localities within the south eastern area of the solar farm development footprint.

- **reduce the area of occupancy of the species**

The Project will reduce the extent of mapped important habitat for this species. The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint, although they do occur nearby. The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any populations of the Regent Honeyeater, as this species is highly mobile and nomadic.

- **adversely affect habitat critical to the survival of a species**

The National Recovery Plan identifies that habitat critical to the survival of the Regent Honeyeater includes:

- Any breeding or foraging areas where the species is likely to occur (as mapped).
- Any newly discovered breeding or foraging locations.

The Development Footprint is mapped in or near the Mudgee Wollar breeding area shown in the National Recovery Plan and within an area where the species is likely to occur (DOE 2016).

- **disrupt the breeding cycle of a population**

The Project will reduce the extent of mapped important habitat for this species. The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint, although they do occur nearby. It is considered that the Project would not disrupt the breeding of this species within the Goulburn River National Park or other known breeding locations nearby.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint. The Project will reduce the extent of suitable foraging habitat available to this species, however suitable impact avoidance measures have been applied and the establishment of a Biodiversity Stewardship Agreement (BSA) of the residual parts of the Development Footprint would provide an opportunity to improve the areas of retained habitats.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Regent Honeyeater.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the Regent Honeyeater to decline.

- **interfere with the recovery of the species.**

The Project is unlikely to interfere directly with the recovery of this species, however the Project may indirectly affect this species recovery through the removal of suitable foraging habitat for this species in an area of mapped Important Habitat.

4.2.2.2 Impact Avoidance Measures

The Project has been designed to minimise impacts to areas of Important Habitat mapped for the Biodiversity Assessment Method, for this species. The Important Habitat mapping was created using the following methods:

- Generation of a dataset of occurrence records.
- Mapping important bird areas identified in the National Recovery Plan for the Regent Honeyeater and refinement through expert opinion, vegetation association identification and mapping of woodland vegetation within 200 m of records.
- Application of one-kilometre radial buffers to woodland vegetation associated with the species for records of single breeding events located outside of mapped important bird areas.

- Application of five-kilometre radial buffers to woodland vegetation associated with the species for records of multiple breeding events outside of the mapped important bird areas.
- The Development Footprint has been reduced by the proponent to minimise impacts to areas mapped as important habitat.

4.2.2.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of mapped important habitat within the Project Area.

4.2.2.4 Impacts of the 2019–2020 bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, including areas of mapped Regent Honeyeater Important Habitat.

The 2019–2020 mega fire event that impacted the east coast of Australia represent a significant pulse impact on the quality of the habitat for this species. Crates *et al.*, 2020 have estimated that the 2019–2020 fires burnt an estimated 71,011 square kilometres representing 13% of the species area of occupancy with hit to very high burn severity identified for 54% of the burnt area. This study also identified that nest locations known since 2015 returned the most severe fire impact estimate, with 44% of 1 km grid cells where nesting has been recorded having been impacted by fire.

4.2.2.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is likely to result in a significant impact to the Regent Honeyeater.

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a Biodiversity Stewardship Site, to generate species credits which would directly offset impacts on mapped Important Habitat for the Regent Honeyeater. Residual credit requirements would be sourced in accordance with the like-for-like requirements and would include measures such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.3 Southern Whiteface (*Aphelocephala leucopsis*)

4.2.3.1 Important Population Criteria

The Southern Whiteface is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Southern Whiteface were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.3.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Southern Whiteface and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Southern Whiteface and the Project is unlikely to reduce the area of occupancy of an important population of the Southern Whiteface.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Southern Whiteface and the Project is not a type of development which is likely to fragment the habitat of species.

- adversely affect habitat critical to the survival of a species

According to DCCEE (2023f), Habitat critical to the survival of the Southern Whiteface includes areas that have:

- relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat;
- living and dead trees with hollows and crevices which are essential for roosting and nesting.

- The Development Footprint has been disturbed by a history of agricultural use and does not contain habitat critical to the survival of this species.
- disrupt the breeding cycle of an important population.

The Development Footprint does not contain an important population of the Southern Whiteface and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is unlikely to interfere directly with the recovery of this species.

4.2.3.3 Impact Avoidance Measures

The Southern Whiteface was not observed during surveys, however, there are records of this species nearby the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.3.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.

- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.3.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.3.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Southern Whiteface.

4.2.4 Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

4.2.4.1 Important Population Criteria

The Glossy Black-Cockatoo is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Glossy Black-Cockatoo were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.4.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species is listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project is not likely to reduce the area of occupancy of an important population of the Glossy Black-Cockatoo.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

According to DCCEE (2022b), habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community.

No areas necessary for the above factors are considered to be present within the Development Footprint. The Project is thus considered unlikely to adversely affect habitat critical to the survival of the species.

- disrupt the breeding cycle of an important population

No breeding habitat use was observed onsite during targeted habitat surveys. Thus, the Project is considered unlikely to affect habitat critical to the survival of the species.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.4.3 Impact Avoidance Measures

Glossy Black-Cockatoo was observed within the Project Area during surveys for the Project.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.4.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.4.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The subspecies was severely affected by the 2019–2020 bushfires, with a significant portion of their known range burnt (Cameron et al. 2021). They were identified as a priority species post 2019–2020 bushfires, requiring urgent management interventions (Legge *et al* 2020).

4.2.4.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Glossy Black Cockatoo.

4.2.5 Large-Eared Pied Bat (*Chalinolobus dwyeri*)

4.2.5.1 Important Population Criteria

The Large-eared Pied Bat is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Large-eared Pied Bat were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.5.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Large-eared Pied Bat and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Large-eared Pied Bat and the Project is not likely to reduce the area of occupancy of an important population of the White-throated Needletail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Large-eared Pied Bat. This species is highly mobile and capable of traversing large areas of discontinuous and unsuitable habitat. The proposed action is not likely to fragment a population of this species.

- adversely affect habitat critical to the survival of a species

There is no current definition of habitat critical to the survival of this species (DAWE 2021b).

The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. Further refinements to the Project footprint have resulted in the retention of PCTs associated with the threatened microbat species Large-eared Pied Bat. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Large-eared Pied Bat. Thus, the project will not disrupt the breeding cycle of an important population of this species.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. Further refinements to the Project footprint have resulted in the retention of PCTs associated with the threatened microbat species Large-eared Pied Bat and Eastern Cave Bat. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.5.3 Impact Avoidance Measures

The large-eared Pied Bat was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.5.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 7.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.5.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The Conservation Advice for this species estimates that 26.6% of the species habitat occurs within areas affected by the 2019–2020 wildfires (DAWE 2021). The impact of these fires is yet to be thoroughly assessed. Individuals congregate to roost and raise young which places a reasonable proportion of a local population at a single locality. Most known cave roosts are in shallow caves or in the outer reaches of deeper mines or caves. As such, individuals are potentially susceptible to direct mortality from heat and smoke from fires. Mortality can be expected to be higher during high intensity fires or where fires occur on a regular basis. Mortality is potentially higher for creched young unable to escape smoke as adults may be able to. The longer-term impacts of fire frequency and intensity on the Large-eared Pied Bat are unknown.

4.2.5.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Large-eared Pied Bat.

4.2.6 Brown Treecreeper (South-Eastern) (*Climacteris picumnus victoriae*)

4.2.6.1 Important Population Criteria

The Brown Treecreeper (south-eastern) is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required.

An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Brown Treecreeper (south-eastern) were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.6.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project is not likely to reduce the area of occupancy of an important population of the Brown Treecreeper (south-eastern).

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project is not a type of development which is likely to fragment the habitat of species.

- adversely affect habitat critical to the survival of a species

According to DCCEE (2023e), habitat critical to the survival of the brown treecreeper (south-eastern) includes areas that have:

- Relatively undisturbed grassy woodland with native understorey.
- Habitat structure should be quite open at ground level so that birds are able to feed on or near the ground and maintain vigilance against predators.
- The required degree of openness is mostly likely to be created by moderate levels of disturbance by fire and/or grazing.
- large living and dead trees which are essential for roosting and nesting sites and for foraging.
- fallen timber which provides essential foraging habitat.
- hollows in standing dead or live trees and tree stumps are also essential for nesting.

As the vegetation within the Development Footprint is highly disturbed, the vegetation largely does not meet the standard of habitat critical to the survival of this species. However, impact avoidance has been achieved for the relatively undisturbed parts of the Project Area where suitable habitat is present. Thus, the Project is unlikely to adversely affect habitat critical to the survival of this species.

- disrupt the breeding cycle of an important population.

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.6.3 Impact Avoidance Measures

The Brown Treecreeper (south-eastern) was not observed during surveys, however, there are records of this species nearby the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.6.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.

The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.6.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.6.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Brown Treecreeper (south-eastern).

4.2.7 Spotted-Tailed Quoll (*Dasyurus maculatus maculatus*) (South-East Mainland Population)

4.2.7.1 Significant Impact Assessment

The Spotted-tailed Quoll (South-east Mainland Population) is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of a population

The Spotted-tailed Quoll has not been observed during surveys and there are no records for this species within approximately 10 km of the Development Footprint on the BioNet Atlas (NSW DPE 2022a).

The Development Footprint provides areas of highly disturbed habitat for this species. This species occupies a relatively large home range and there are larger areas of higher quality habitats present within the Goulburn River National Park. It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of a population of this species.

- reduce the area of occupancy of the species

The Spotted-tailed Quoll has not been observed during surveys and there are no records for this species within approximately 10 km of the Development Footprint on the BioNet Atlas (NSW DPE 2022a). It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- fragment an existing population into two or more populations

The Development Footprint is already highly disturbed, and this species has not been observed during surveys. The Goulburn River National Park contains higher quality areas of suitable habitat for this species which will maintain connectivity through the locality. It is considered that the Project is not likely to fragment an existing population of this species.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan for the Spotted-tailed Quoll (VDELWP 2016) identifies that, habitat that is critical to the survival of the Spotted-tailed Quoll includes large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey. The Development Footprint consists of highly disturbed and fragmented agricultural land which does not contain any identified denning resources. It is considered that the Development Footprint is not an area of habitat critical to the survival of the Spotted-tailed Quoll.

- disrupt the breeding cycle of a population

This species has not been observed breeding within the Development Footprint. It is considered that the Project is not likely to disrupt the breeding cycle of a population of the Spotted-tailed Quoll.

- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The nearest record for the Spotted-tailed Quoll on the BioNet Atlas (NSW DPE 2022a) is approximately 10 km south of the Development Footprint. This species was not observed during surveys, and it is considered that the Project will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Spotted-tailed Quoll.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause the Spotted-tailed Quoll to decline.

- interfere with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.7.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.4** of the BDAR.

4.2.7.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to improve areas of suitable habitat within the Project Area.

4.2.7.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires, although parts of the Goulburn River National Park adjoining the eastern and southern parts of the Project Area were burnt. It is considered that a large proportion of the suitable habitat for this species within NSW was burnt during the 2019–2020 bushfires, with Conservation Advice (Threatened Species Scientific Committee 2020) identifying that 29 percent of the Spotted-tailed Quoll’s distribution range overlaps with the fire-affected extent. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite fire-associated impacts to the Spotted-tailed Quoll across its range, it is considered that the Development Footprint is not likely to provide regularly occupied foraging or shelter habitat.

4.2.7.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on the Spotted-tailed Quoll.

This species is an ecosystem credit entity under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.8 Painted Honeyeater (*Grantiella picta*)

4.2.8.1 Important Population Criteria

The Painted Honeyeater is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

No Painted Honeyeaters were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.8.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project is not likely to reduce the area of occupancy of an important population of the Painted Honeyeater.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan for this species (DAWE 2021a) identifies that habitat critical to the survival of this species can include breeding habitat, foraging habitat (both known and likely) and habitat for the long-term maintenance of the species. The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. It is therefore considered that the Development Footprint contains habitat critical to the survival of this species. It should be noted however the suitable foraging habitat present are limited to *Amyema* mistletoes present in low densities in scattered trees in areas which have been highly disturbed by a long history of agricultural land use. Furthermore, the Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Painted Honeyeater and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.8.3 Impact Avoidance Measures

The Painted Honeyeater was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDARs.

4.2.8.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat within the Project Area.

4.2.8.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, however areas where this species has previously been recorded on the BioNet Atlas (NSW DPE 2022a) within approximately 10 km have largely not been affected.

4.2.8.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project will remove habitat critical to the survival of this species, as defined in the National Recovery Plan (DAWE 2021a). The Project therefore has the potential to have a significant impact on the Painted Honeyeater.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.9 White-Throated Needletail (*Hirundapus caudacutus*)

4.2.9.1 Significant Impact Assessment

The White-throated Needletail is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

White-throated Needletail were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the White-throated Needletail and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the White-throated Needletail and the Project is not likely to reduce the area of occupancy of an important population of the White-throated Needletail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the White-throated Needletail and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

There is no current definition of habitat critical to the survival of this species (TSSC 2019).

The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

This species doesn't breed in Australia, and thus, the Development Footprint is not considered to contain any breeding habitat for this species.

The Development Footprint does not contain an important population of the White-throated Needletail and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.9.2 Impact Avoidance Measures

The White-throated Needletail was observed during surveys.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.9.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.

The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.9.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.9.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the White-throated Needletail.

4.2.10 Swift Parrot (*Lathamus discolor*)

4.2.10.1 Significant Impact Assessment

The Swift Parrot is listed as critically endangered under the EPBC Act. The significant impact assessment criteria for critically endangered species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of a population

This species has not been observed within the Development Footprint and is not likely to be directly impacted by the Project. There are no areas of mapped Important Habitat for this species within the Development Footprint. The nearest record for this species on the BioNet Atlas (NSW DPE 2022a) is from 2005 and located approximately 12 km to the south-west near the Wollar Railway Tunnel.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of the population of the Swift Parrot.

- reduce the area of occupancy of the species

The Swift Parrot has a large geographic range compared to its population size and no areas of mapped Important Habitat are present on the Development Footprint or nearby. The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- fragment an existing population into two or more populations

The Project will not fragment any habitat for the Swift Parrot, as this species is highly mobile and nomadic.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan identifies that habitat critical to the survival of the Swift Parrot includes:

- Breeding and foraging habitat in Tasmania.
- Foraging habitat on the Australian mainland which contains preferred foraging species within known and likely foraging habitat.

The Development Footprint contains potential foraging habitat and the preferred foraging species White Box (*Eucalyptus albens*) (AGDOE 2016) and therefore meets the definition for habitat which is potentially critical to the survival of the Swift Parrot.

- disrupt the breeding cycle of a population

The Swift Parrot only breeds in Tasmania, therefore the Project has no potential to disrupt the breeding cycle of this species.

- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Swift Parrot has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint. The Project will reduce the extent of suitable foraging habitat available to this species, however suitable impact avoidance measures have been applied and the establishment of a BSA of the residual parts of the Development Footprint would provide an opportunity to improve the areas of retained habitats.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Swift Parrot.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause the Swift Parrot to decline.

- interfere with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.10.2 Impact Avoidance Measures

The Swift Parrot has not been observed during surveys and the Development Footprint is not mapped as Important Habitat for the Swift Parrot under the BAM. The nearest record for this species on the BioNet Atlas (NSW DPE 2022a) is from 2005 and located approximately 12 km to the south-west near the Wollar Railway Tunnel.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.10.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.

The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.

- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.
- The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat within the Project Area.

4.2.10.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, including areas of suitable habitat for the Swift Parrot.

The 2019–2020 mega fire event that impacted the east coast of Australia represent a significant pulse impact on the quality of the habitat for the Swift Parrot. The Draft National Recovery Plan estimates that between 10–30 percent of the distribution range of the Swift Parrot was impacted to some extent, with increasing likelihood of future similar fire events as a result of climate change (AGDAWE 2021a).

4.2.10.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on the Swift Parrot.

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.11 South-Eastern Hooded Robin (*Melanodryas cucullata cucullata*)

4.2.11.1 Significant Impact Assessment

The South-eastern Hooded Robin is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

This species has been recorded near the Project Area but has not been observed within the Development Footprint and is not likely to be directly impacted by the Project.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of a population of the South-eastern Hooded Robin.

- **reduce the area of occupancy of the species**

The Project will reduce the extent of potential habitat for this species. The South-eastern Hooded Robin has a relatively large geographic distribution occurring in south-east Australia spanning from far south-east Queensland to York Peninsula in South Australia. The population is not severely fragmented, and the number of locations is greater than 10 (DCCEEW 2023d). The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any populations of the South-eastern Hooded Robin, as the Project Area does not contain confirmed occupied habitat and are heavily degraded.

- **adversely affect habitat critical to the survival of a species**

According to the Conservation Advice (DCCEEW 2023d), habitat critical to the survival of the hooded robin (south-eastern) include areas of:

- dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas
- structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses
- standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging
- moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.

The Development footprint is substantially degraded following a history of agricultural use and this species was not observed during surveys. It is considered that it does not contain habitat critical to the survival of this species.

- **disrupt the breeding cycle of a population**

The Project will not disrupt the breeding cycle of any populations of the South-eastern Hooded Robin, as the Project Area does not contain confirmed occupied habitat and are heavily degraded.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that this species is likely to decline as the Project Area does not contain confirmed occupied habitat and are heavily degraded. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the South-eastern Hooded Robin.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the South-eastern Hooded Robin to decline.

- **interfere with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.11.2 Impact Avoidance Measures

The South-eastern Hooded Robin was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 8.4** of the BDAR.

4.2.11.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.0** of the solar farm and road upgrade BDAR Reports. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.11.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.11.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is not likely to result in a significant impact to the South-eastern Hooded Robin.

4.2.12 Diamond Firetail (*Stagonopleura guttata*)

4.2.12.1 Important Population Criteria

The Diamond Firetail is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Diamond Firetail were observed during surveys, however, it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.12.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Diamond Firetail and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Diamond Firetail and the Project is not likely to reduce the area of occupancy of an important population of the Diamond Firetail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Diamond Firetail and the Project is not a type of development which is likely to fragment the habitat of this species.

- adversely affect habitat critical to the survival of a species

According to DCCEEW (2023a), Habitat critical to the survival of the Diamond Firetail includes areas of:

- Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats.
- Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding.
- Drooping She-oak (*Allocasuarina verticillata*) within the Mt Lofty Ranges.
- Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but which could become suitable again in the future, should also be considered habitat critical to the survival of the species.
- Scattered trees with areas of high grass cover are present within the Development Footprint. Thus, the Project will affect habitat critical to the survival of the species.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Diamond Firetail and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.12.3 Impact Avoidance Measures

The Diamond Firetail was observed during surveys. The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.12.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.12.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.12.6 Significant Impact Assessment Conclusion and Proposed Offsets

The proposal will impact an area of suitable habitat for the Diamond Firetail, however the better-quality habitats present within the Project Area will be retained and the Project Area is surrounded by large areas of suitable habitat within the Goulburn River National Park. It is therefore considered that the proposal is unlikely to have a significant impact on this species.

4.2.13 Koala (Combined Populations of QLD, NSW, ACT) (*Phascolarctos cinereus*)

4.2.13.1 Significant Impact Assessment

The Koala is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

The Koala has not been observed during surveys and the Development Footprint is identified in the Koala Habitat Information Base – Koala Likelihood Map as mostly having No Koala Records, with the exception of a 10x10 km grid cell overlapping the south-western corner which has a 0.00–0.25 likelihood of occurrence (NSW DPIE 2019). There is one record for the Koala on the Development Footprint from the 1957, and the only recent records for this species from within the last 20 years are from approximately 4.5 km to the south-west along the floodplain of the Goulburn River (NSW DPE 2022a).

It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of a population of the Koala.

- **reduce the area of occupancy of the species**

Based on the lack of recent observations for the Koala within the Development Footprint it is considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any habitat for the Koala, as this species is considered unlikely to occur within the Development Footprint or directly adjoining areas.

- **adversely affect habitat critical to the survival of a species**

Considerations for determining critical habitat for the Koala are provided in the National Recovery Plan (AGDAWE 2022). It is considered that the Development Footprint is not an area of habitat critical to the survival of the Koala.

- **disrupt the breeding cycle of a population**

No Koalas have been observed breeding within the Development Footprint. It is considered that the Project is not likely to disrupt the breeding cycle of a population of Koalas.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

There are no records for the Koala on the BioNet Atlas (NSW DPE 2022a) within the Development Footprint since 1957. This species was not observed during surveys and it is considered that the Project will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Koala.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the Koala to decline.

- **interfere with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.13.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.4** of the BDAR.

4.2.13.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to improve areas of suitable habitat within the Project Area.

4.2.13.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires, although parts of the Goulburn River National Park adjoining the eastern and southern parts of the Project Area were burnt.

The National Recovery Plan for the Koala (AGDAWE 2022b) identifies that the 2019–2020 bushfires killed, injured or affected an estimated 61,000 Koalas and burnt 3,659,625 ha (9%) of the area within which the listed Koala and its habitat are known or likely to occur. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite these impacts to the Koala across its range it is considered that the Development Footprint is not likely to provide occupied foraging, shelter or fire refuge habitat for the Koala.

4.2.13.5 Significant Impact Assessment Conclusion and Proposed Offsets

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA. This species is assessed under the BAM with species credits where it is known or assumed to occur. This species was not observed during surveys and no offsets are required for this species.

4.2.14 Corben’s Long-Eared Bat (*Nyctophilus corbeni*)

4.2.14.1 Significant Impact Assessment

The Corben’s Long-eared Bat is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

The Development Footprint is near the eastern limit of this species range, and it is therefore that occurrences of this species may constitute an important population.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of an important population of a species**

The Project will require the removal of suitable foraging and shelter habitats for this species. There are larger areas of suitable habitat for this species surrounding the Project Area within the Goulburn River National Park. It is therefore considered that the Project is unlikely to lead to a long-term decrease in the size of an important population of this species.

- **reduce the area of occupancy of an important population**

The habitats which will be impacted by the Project are highly disturbed and are surrounded by higher quality habitats within the Goulburn River National Park. Large parts of the Project Area will also be retained and may be utilised as a biodiversity offset for the Project. It is therefore considered that the Project is not likely to reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations**

The Project is not a type of development which is likely to fragment the habitat of this highly mobile species.

- **adversely affect habitat critical to the survival of a species**

There are larger areas of suitable habitat for this species within the adjoining Goulburn River National Park. The areas which will be impacted by the Project have been disturbed by a long history of agricultural land use and it is considered that the Project is not likely to affect habitat critical to the survival of this species.

- **disrupt the breeding cycle of an important population**

The Development Footprint does contain suitable breeding habitat for this species, however there are larger areas of suitable breeding habitat present within the surrounding Goulburn River National Park. It is therefore considered that the Project is unlikely to disrupt the breeding cycle of an important population of Corben's Long-eared Bat.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- **interfere substantially with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.14.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.14.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat for this species within the Project Area.

4.2.14.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event. This species is at the eastern edge of its distribution within the Development Footprint and most of the areas affected by the 2019–2020 bushfires are likely to be outside of this species range.

4.2.14.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on Corben’s Long-eared bat.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.15 Grey-Headed Flying-Fox (*Pteropus poliocephalus*)

4.2.15.1 Significant Impact Assessment

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

No Grey-headed Flying-foxes were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of an important population of a species**

The Project will require the removal of suitable foraging habitats for this species. The Project will not impact any known roost or camp sites for this species. There are larger areas of suitable habitat for this species surrounding the Project Area within the Goulburn River National Park. It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of an important population of this species.

- **reduce the area of occupancy of an important population**

The habitats which will be impacted by the Project are highly disturbed and are surrounded by higher quality habitats within the Goulburn River National Park. Large parts of the Project Area will also be retained and may be utilised as a biodiversity offset for the Project. It is therefore considered that the Project is unlikely to reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations**

The Project is not a type of development which is likely to fragment the habitat of this highly mobile species.

- **adversely affect habitat critical to the survival of a species**

There are larger areas of suitable habitat for this species within the adjoining Goulburn River National Park. The areas which will be impacted by the Project have been disturbed by a long history of agricultural land use and it is considered that the Project is not likely to affect habitat critical to the survival of this species.

- **disrupt the breeding cycle of an important population**

The Development Footprint does not contain known breeding habitat for this species and the nearest camp site is located in Mudgee. It is therefore considered that the Project is unlikely to disrupt the breeding cycle of an important population of the Grey-headed Flying-fox.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- **interfere substantially with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.15.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.15.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat for this species within the Project Area.

4.2.15.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event. The National Recovery Plan for this species (AGDAWE 2021c) identifies that although several of the impacts have not been quantified, preliminary analysis indicates that the associated impact of the fires on this species are likely to be significant in relation to foraging habitat, but only minor in relation to impacts at camp sites. The National Flying Fox Monitoring Viewer identifies that the nearest camp sites for this species are located at Mudgee, 57 km to the south-west and Muswellbrook, 71 km to the east. The National Recovery Plan (AGDAWE 2021c) identifies that this species travels as far as 40 km to feed before returning to their roost the same night. It is considered that the known camp sites nearest to the Project are at or over the limit of this species nightly flying range and it is expected that the site would only be used infrequently or during passage between camp sites.

4.2.15.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is not likely to have a significant impact on the Grey-headed Flying-fox.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.3 Additional Analysis of Impacts of 2019–2020 Bushfires for Priority Management Species

The following additional Priority Management Species require analysis of the impacts of the 2019–2020 bushfires as part of this Report:

- Koala (*Phascolarctos cinereus*).
- Greater Glider (*Petauroides volans*).
- Brush-tailed Rock Wallaby (*Petrogale penicillata*).
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus* – south-east mainland population).
- New Holland Mouse (*Pseudomys novaehollandiae*).
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

4.3.1 Koala (*Phascolarctos cinereus*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The National Recovery Plan for the Koala (DAWE 2022c) identifies that the 2019–2020 bushfires killed, injured or affected an estimated 61,000 Koalas and burnt 3,659,625 ha (9%) of the area within which the listed Koala and its habitat are known or likely to occur. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite these impacts to the Koala across its range it is considered that the subject land is unlikely to provide occupied foraging, shelter or fire refuge habitat for the Koala.

4.3.2 Greater Glider (*Petauroides volans*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

An estimated 40% of the distribution of the greater glider (southern and central) overlapped with the areas affected by the bushfires 2019–2020. A population decline analysis for the greater glider (southern and central) that incorporates spatial variation in fire severity plus estimated declines for differing fire severity classes, provided an estimate of overall decline for the taxon of 24% (range 17–31%) one year after the fire, assuming current management conditions (DCCEEW 2022a).

4.3.3 Brush-Tailed Rock Wallaby (*Petrogale penicillata*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The 2019–2020 bushfires overlapped with approximately 50 percent of the Brush-tailed Rock-wallaby's distribution. The Brush-tailed Rock-wallaby is considered less susceptible to direct mortality from fire than some other mammal species, because it has access to rocky shelters that can protect animals from radiant heat, however increased predation and lack of food after fires may cause additional mortality (DAWE 2021c).

4.3.4 Spotted-Tailed Quoll (*Dasyurus maculatus maculatus* – South-East Mainland Population)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

It is considered that a large proportion of the suitable habitat for this species within NSW was burnt during the 2019–2020 bushfires, with Conservation Advice (TSSC 2020) identifying that 29 percent of the Spotted-tailed Quoll's distribution range overlaps with the fire-affected extent. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event.

4.3.5 New Holland Mouse (*Pseudomys novaehollandiae*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.3.6 Grey-Headed Flying-Fox (*Pteropus poliocephalus*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The National Recovery Plan for this species (DAWE 2021d) identifies that although several of the impacts have not been quantified, preliminary analysis indicates that the associated impact of the fires on this species are likely to be significant in relation to foraging habitat, but only minor in relation to impacts at camp sites. The National Flying Fox Monitoring Viewer (DCCEEW 2023) identifies that the nearest camping site for this species is located at Aberdeen, and the closest nationally important flying-fox camp is located at Muswellbrook.

4.4 EPBC Act Significant Impact Assessment Conclusions

The assessments of significance undertaken have identified that the Project has potential to significantly impact the following listed threatened species and ecological communities:

- White Box – Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland.
- Regent Honeyeater (*Anthochaera phrygia*).
- Painted Honeyeater (*Grantiella picta*).

The impacts of the Project will be offset in accordance with the requirements of the BAM and the Bilateral Assessment Agreement and the like-for-like biodiversity offsetting rules under the EPBC Act for all entities which are likely to be significantly impacted.

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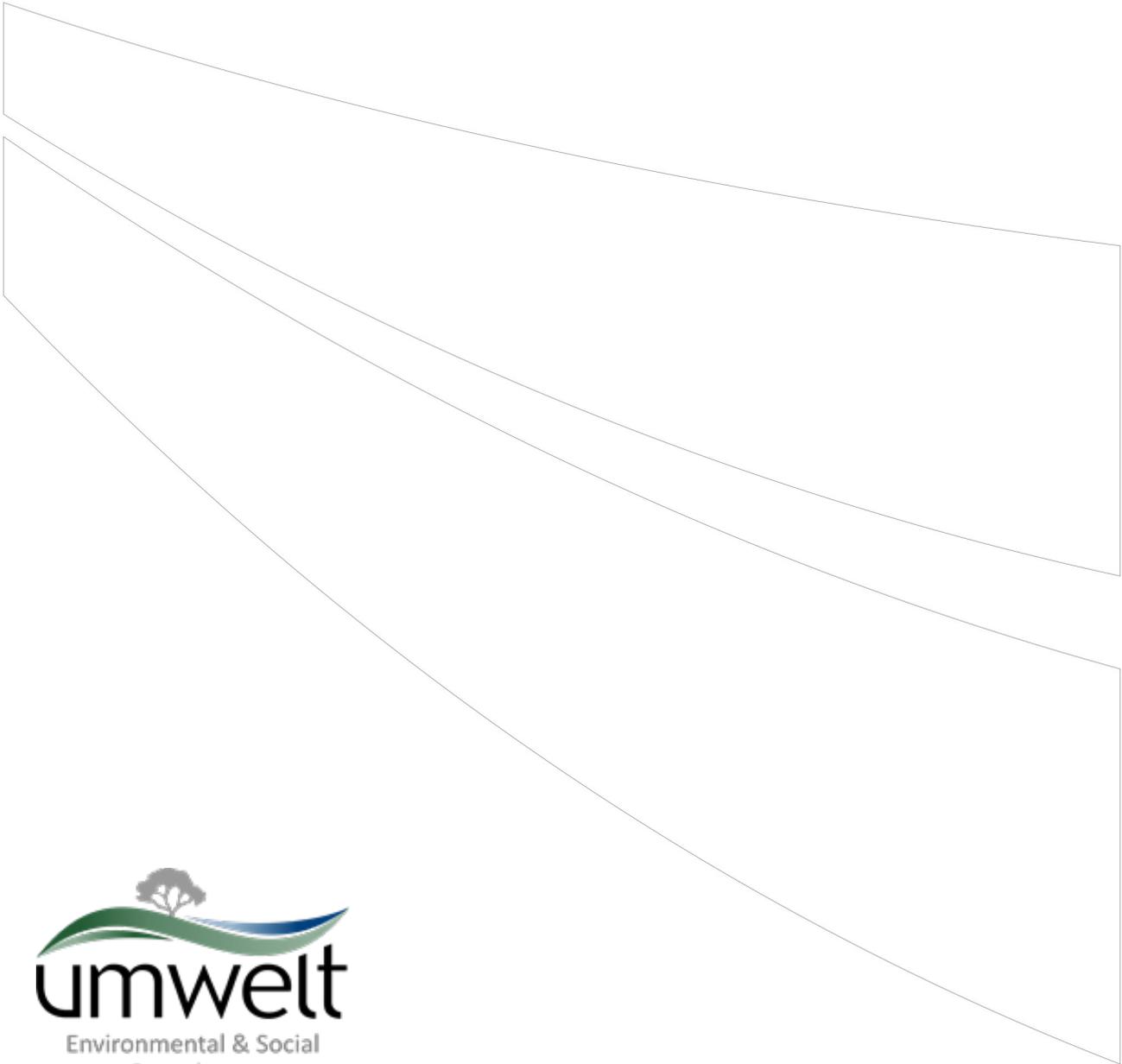
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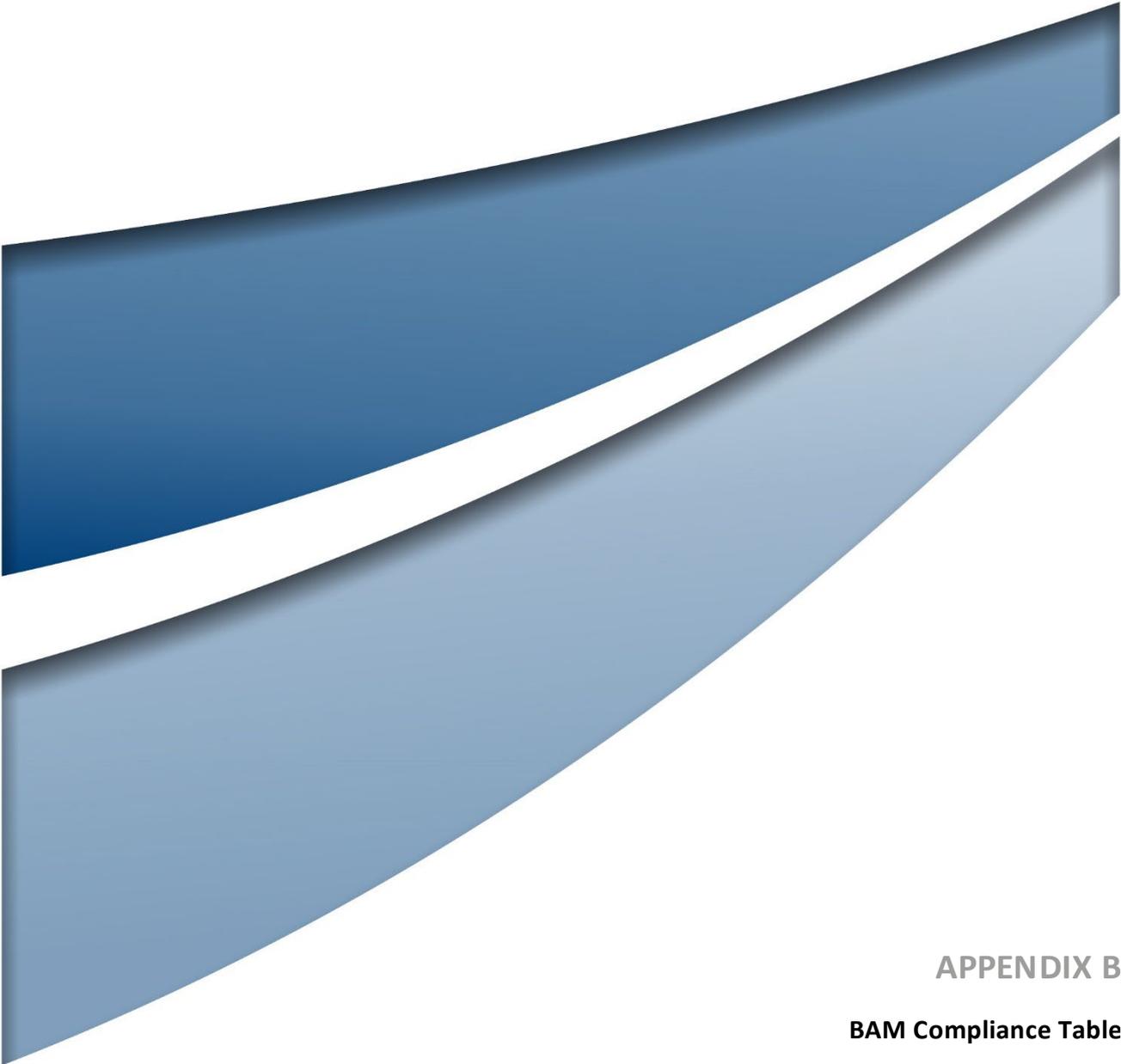
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APPENDIX B
BAM Compliance Table

1.0 SEARS & BDAR Requirement Compliance

1.1 SEARS Requirements Compliance Details

Compliance with the SEARs Biodiversity Assessment Requirements for the project is documented in **Table A.1**.

Table A.1 Biodiversity Assessment Requirements for the project

Relevant Agency	Requirements	Comments
NSW DPIE SEARs	An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values	This BDAR has been prepared in accordance with the BC Act, the BC Regulation and the Biodiversity Assessment Method. The NSW DPIE BDAR template and associated Guidance for the Biodiversity Development Assessment Report Template documentation (DPIE 2022) has also been utilised to guide the format and content of the BDAR. The BDAR minimum information compliance requirements are addressed in Section 1.2 of this Appendix.
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;	Impact avoidance and minimisation measures are addressed in Section 7.0 of the BDAR. Direct impacts are documented in Section 8.1 of the BDAR. Indirect Impacts are documented in Section 8.2 of the BDAR. Prescribed Impact are documented in Section 8.3 of the BDAR.
	An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts.	A separate Aquatic Assessment is provided as an Appendix to the EIS covering this requirement for the Solar Farm Project Area.
	If an offset is required, details of the measures proposed to address the offset obligations.	The Biodiversity Offset Strategy for the project is documented in Section 11.3 of the BDAR.
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	Details of the project team and accredited assessor are included in the Declarations page at the front of the BDAR.

Relevant Agency	Requirements	Comments
SEARs - BCD Standard Environmental Assessment Requirements	<p>Biodiversity impacts related to the proposed development (SSD-33951458) are to be assessed in accordance with the Biodiversity Assessment Method 2020 and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method 2020.</p>	<p>This BDAR has been prepared in accordance with the BC Act, the BC Regulation and the Biodiversity Assessment Method. The NSW DPIE BDAR template and associated Guidance for the Biodiversity Development Assessment Report Template documentation (DPIE 2022) has also been utilised to guide the format and content of the BDAR.</p> <p>The BDAR minimum information compliance requirements are addressed in Section 1.2 of this Appendix.</p>
	<p>The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method 2020.</p>	<p>Impact avoidance and minimisation measures are addressed in Section 7.0 of the BDAR.</p> <p>Direct impacts are documented in Section 8.1. of the BDAR.</p> <p>Indirect Impacts are documented in Section 8.2 of the BDAR.</p> <p>Prescribed Impact are documented in Section 8.3 of the BDAR.</p>
	<p>The BDAR must include details of the measures proposed to address the offset obligation as follows;</p> <ul style="list-style-type: none"> • The total number and classes of biodiversity credits required to be retired for the development/project; • The number and classes of like-for-like biodiversity credits proposed to be retired; • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • Any proposal to fund a biodiversity conservation action; • Any proposal to conduct ecological rehabilitation (if a mining project); • Any proposal to make a payment to the Biodiversity Conservation Fund. <p>If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.</p>	<p>Details of the offset obligations of the project are provided in Section 11 of the BDAR.</p>

Relevant Agency	Requirements	Comments
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	Details of the project team and accredited assessor are included in the Declarations page at the front of the BDAR.
Australian Government – Department of Climate Change, Energy, the Environment and Water	Guidelines for preparing assessment documentation relevant to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) for proposals being assessed under the NSW Assessment Bilateral Goulburn River Solar Farm (EPBC 2021/9102), issued as part of the SEARS.	This requirement is addressed in Appendix A as part of the Matters of National Environmental Significance Assessment Report.

1.2 BDAR Requirements Compliance Details

Compliance with the BDAR minimum information requirements of the BAM is documented in **Table A.2**.

Table A.2 Assessment of Compliance with BDAR Minimum Information Requirements

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Introduction	Chapters 2 and 3	Information	
		Introduction to the biodiversity assessment including:	–
		<input checked="" type="checkbox"/> brief description of the proposal	Section 1.2.1
		<input checked="" type="checkbox"/> identification of subject land boundary, including:	Section 1.2.2 and Figure 1.1 and Figure 1.2
		<input checked="" type="checkbox"/> operational footprint	
		<input checked="" type="checkbox"/> construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	
		<input checked="" type="checkbox"/> general description of the subject land	Section 1.1.2
		<input checked="" type="checkbox"/> sources of information used in the assessment, including reports and spatial data	Section 1.6. Also referenced in text and listed in the References Section.
		<input checked="" type="checkbox"/> identification and justification for entering the BOS	Section 1.1
		Maps and tables	
<input checked="" type="checkbox"/> Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Figure 1.1		
Landscape	Section 3.1 and Section 3.2, Appendix E	Information	
		Identification of site context components and landscape features, including:	–
		<input checked="" type="checkbox"/> general description of subject land topographic and hydrological setting, geology and soils	Section 1.2.2
		<input checked="" type="checkbox"/> per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Section 3.3 and Figure 1.2
		<input checked="" type="checkbox"/> IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Section 3.2.1 and Figure 1.1 and Figure 1.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR	
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	Section 3.2.2 and Figure 1.1 and Figure 1.2	
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	Section 3.2.2 and Figure 3.1	
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Section 3.2.3	
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	Section 3.2.4	
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Section 3.2.5	
		☒ any additional landscape features identified in any SEARs for the proposal	Section 3.2.7	
		☒ NSW (Mitchell) landscape on which the subject land occurs	Section 3.2.6	
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	Section 3.3	
		Maps and tables		
		<ul style="list-style-type: none"> ☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3. 	Figure 1.1	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> Location Map <input checked="" type="checkbox"/> Digital aerial photography at 1:1,000 scale or finer <input checked="" type="checkbox"/> Boundary of subject land <input checked="" type="checkbox"/> Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) <input checked="" type="checkbox"/> Landscape features identified in BAM Subsection 3.1.3 <input checked="" type="checkbox"/> Additional detail (e.g. local government area boundaries) relevant at this scale	Figure 1.2
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		<input checked="" type="checkbox"/> IBRA bioregions and subregions <input checked="" type="checkbox"/> rivers, streams and estuaries <input checked="" type="checkbox"/> wetlands and important wetlands <input checked="" type="checkbox"/> connectivity of different areas of habitat <input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features <input checked="" type="checkbox"/> areas of outstanding biodiversity value occurring on the subject land and assessment area <input checked="" type="checkbox"/> any additional landscape features identified in any SEARs for the proposal <input checked="" type="checkbox"/> NSW (Mitchell) landscape on which the subject land occurs	Figure 1.1 and Figure 1.2
		Data	
		<input checked="" type="checkbox"/> All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		<input checked="" type="checkbox"/> subject land boundary	–
		<input checked="" type="checkbox"/> assessment area (i.e. subject land and 1500 m buffer area) boundary	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> cadastral boundary of subject land	–
		<input checked="" type="checkbox"/> areas of native vegetation cover	–
		<input checked="" type="checkbox"/> landscape features	–
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		<input checked="" type="checkbox"/> Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	Section 4.1 and Figure 4.1
		<input checked="" type="checkbox"/> Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	Section 4.1.2
		<input checked="" type="checkbox"/> Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	Section 2.2.1
		<input checked="" type="checkbox"/> Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Section 2.2.3
		<input checked="" type="checkbox"/> Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	Not applicable
		For each PCT within the subject land, describe:	–
		<input checked="" type="checkbox"/> PCT name and ID	Section 4.2.1, Table 4.1
		<input checked="" type="checkbox"/> vegetation class	Section 4.2.1, Table 4.1
		<input checked="" type="checkbox"/> extent (ha) within subject land	Section 4.2.1, Table 4.1
		<input checked="" type="checkbox"/> evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	Section 4.2.2
		<input checked="" type="checkbox"/> plant species relied upon for identification of the PCT and relative abundance of each species	Section 4.2.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	Section 4.2.2, Section 4.3 and Appendix C
		<input checked="" type="checkbox"/> estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	Table 4.1
		Describe the vegetation integrity assessment of the subject land, including:	–
		<input checked="" type="checkbox"/> identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	Method provided in Section 2.2, Results provided in Table 4.1, Figure 4.2 and Section 4.2.2
		<input checked="" type="checkbox"/> description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	Section 4.2.2
		<input checked="" type="checkbox"/> area (ha) of each vegetation zone	Table 4.1
		<input checked="" type="checkbox"/> assessment of patch size (as described in BAM Subsection 4.3.2)	Table 4.1
		<input checked="" type="checkbox"/> survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	Table 2.1 and Table 4.9
		<input checked="" type="checkbox"/> use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	Section 4.5.3
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	–
		<input type="checkbox"/> identify the PCT or vegetation class for which local benchmark data will be applied <input type="checkbox"/> identify published sources of local benchmark data (if benchmarks obtained from published sources) <input type="checkbox"/> describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	Not applicable
		<input type="checkbox"/> provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	Not applicable

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input type="checkbox"/> provide written confirmation from the decision-maker that they support the use of local benchmark data	Not applicable
		Maps and tables	
		<input checked="" type="checkbox"/> Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 4.1
		<input checked="" type="checkbox"/> Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4.2
		<input checked="" type="checkbox"/> Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 4.2
		<input checked="" type="checkbox"/> Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 2.1
		<input checked="" type="checkbox"/> Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4.3 and Table 4.8
		<input checked="" type="checkbox"/> Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Patch size not mapped and exceeds 100ha for all vegetation condition zones, as listed in Table 4.9
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	–
		<input checked="" type="checkbox"/> composition condition score	Table 4.10
		<input checked="" type="checkbox"/> structure condition score	
		<input checked="" type="checkbox"/> function condition score	
		<input checked="" type="checkbox"/> presence of hollow bearing trees	
		Data	
		<input checked="" type="checkbox"/> All report maps as separate jpeg files	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> Plot field data (MS Excel format)	
		<input checked="" type="checkbox"/> Plot field datasheets	<Appendix D>
		Digital shape files of:	–
		<input checked="" type="checkbox"/> PCT boundaries within subject land	–
		<input checked="" type="checkbox"/> TEC boundaries within subject land	–
		<input checked="" type="checkbox"/> vegetation zone boundaries within subject land	–
		<input checked="" type="checkbox"/> floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	Chapter 5	Information	
		Identify ecosystem credit species likely to occur on the subject land, including:	–
		<input checked="" type="checkbox"/> list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	Table 5.1
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.1
		<input checked="" type="checkbox"/> justification for addition of any ecosystem credit species to the list	Table 5.1 / Justification for inclusion of additional Bionet Atlas species documented in Section 2.4.2
		Identify species credit species likely to occur on the subject land, including:	–
		<input checked="" type="checkbox"/> list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 5.2 and Table 5.3
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.2 and Table 5.3

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	Table 5.2 and Table 5.3
		<input checked="" type="checkbox"/> justification for addition of any species credit species to the list	Table 5.2 and Table 5.3 / Justification for inclusion of additional Bionet Atlas species documented in Section 2.4.2
		From the list of candidate species credit species, identify:	–
		<input checked="" type="checkbox"/> species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.))	Table 5.4 and Table 5.5
		<input checked="" type="checkbox"/> species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.))	
		<input checked="" type="checkbox"/> species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.))	
		<input checked="" type="checkbox"/> species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	
		Present the outcomes of species credit species assessments from:	–
		<input checked="" type="checkbox"/> threatened species survey (as described in BAM Section 5.2.4)	Section 5.2.1 (flora) and Section 5.2.2 (fauna)
		<input type="checkbox"/> expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	Not applicable
Where survey has been undertaken include detailed information on:	–		
<input checked="" type="checkbox"/> survey method and effort (as described in BAM Section 5.3)	Section 5.3		
<input checked="" type="checkbox"/> justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department’s taxa-specific survey guides or where no relevant guideline has been published	Section 2.7, Section 2.3.4 and Section 2.4.4.1		

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	Table 5.6 and Table 5.7
		<input checked="" type="checkbox"/> survey personnel and relevant experience	Project Team including survey personnel are listed in the preface of the report. CVs can be provided on request.
		<input checked="" type="checkbox"/> describe any limitations to surveys and how these were addressed/overcome	Section 2.7
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	–
		<input type="checkbox"/> justification of the use of an expert report	Not applicable
		<input type="checkbox"/> identify the expert, provide evidence of their expert credentials and departmental approval of expert status	
		<input type="checkbox"/> all requirements of Box 3 have been addressed in the expert report	
		Where use of local data is proposed (BAM Subsection 1.4.2):	–
		<input type="checkbox"/> identify relevant species	Not applicable
		<input type="checkbox"/> identify data to be amended	
		<input type="checkbox"/> identify source of information for local data, e.g. published literature, additional survey data, etc.	
		<input type="checkbox"/> justify use of local data in preference to VIS Classification or TBDC data	
		<input type="checkbox"/> provide written confirmation from the decision-maker that they support the use of local data	Not applicable
	Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–	
	<input checked="" type="checkbox"/> the unit of measure for each species is documented	Section 5.3.2	
	for species assessed by area:	–	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	Section 5.3.2, Table 5.8 to Table 5.11 and Figure 5.1 to Figure 5.4
		<input checked="" type="checkbox"/> a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	Section 5.3.2
		for species assessed by counts of individuals:	–
		<input checked="" type="checkbox"/> the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	Section 5.3.2
		<input checked="" type="checkbox"/> the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	Section 5.3.2
		<input checked="" type="checkbox"/> the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	Section 5.3.2
		<input checked="" type="checkbox"/> Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Section 5.3.2, Table 5.8 to Table 5.11
		Maps and tables	
		<input checked="" type="checkbox"/> Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	Table 5.1
		<input checked="" type="checkbox"/> the ecosystem credit species removed from the list	Table 5.1
		<input checked="" type="checkbox"/> the sensitivity to gain class of each species	Table 5.1
		<input checked="" type="checkbox"/> Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 5.2 and Table 5.3
		<input checked="" type="checkbox"/> the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	Table 5.2 and Table 5.3
	<input checked="" type="checkbox"/> the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 5.4 and Table 5.5	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Prescribed impacts		<input checked="" type="checkbox"/> Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	Section 5.3.2, Table 5.8 to Table 5.11
		<input checked="" type="checkbox"/> Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	Figure 5.1 to Figure 5.4
		Data	
		<input checked="" type="checkbox"/> Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		<input checked="" type="checkbox"/> Survey locations including GPS coordinates of any plots, transects, grids	
		<input checked="" type="checkbox"/> Digital shape files of each species polygon including GPS coordinates of located individuals	–
		<input checked="" type="checkbox"/> Species polygon map in jpeg format	–
		<input type="checkbox"/> Expert reports and any supporting data used to support conclusions of the expert report	Not applicable
		<input checked="" type="checkbox"/> Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	Field data captured digitally
Prescribed impacts	Chapter 6	Information	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	–
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1)	Table 6.1
		<input checked="" type="checkbox"/> occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2)	
<input checked="" type="checkbox"/> corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3)			
<input checked="" type="checkbox"/> waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)			

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR	
		<input type="checkbox"/> protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	Not applicable	
		<input checked="" type="checkbox"/> where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Table 6.1	
		<input checked="" type="checkbox"/> Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Table 6.1	
		<input checked="" type="checkbox"/> Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	Table 6.1	
		Where the proposed development is for a wind farm:	–	
		<input type="checkbox"/> identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	Not applicable	
		<input type="checkbox"/> provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	Not applicable	
		<input type="checkbox"/> predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	Not applicable	
		Where the proposal may result in vehicle strike:	–	
		<input checked="" type="checkbox"/> identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	Table 6.1	
		Maps and tables		
		<input checked="" type="checkbox"/> Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 6.1	
<input checked="" type="checkbox"/> Map showing location of potential vehicle strike locations	Figure 6.1			

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input type="checkbox"/> Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	Not applicable
		Data	
		<input checked="" type="checkbox"/> Digital shape files of prescribed impact feature locations	–
		<input checked="" type="checkbox"/> Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	Information	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	–
		<input checked="" type="checkbox"/> modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	Section 7.1.2.6
		<input checked="" type="checkbox"/> routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	Section 7.1.1.6
		<input checked="" type="checkbox"/> alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Section 7.1.1.1 to Section 7.1.1.5, Section 7.1.1.8
		<input checked="" type="checkbox"/> alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	Section 7.1.1.7
		<input checked="" type="checkbox"/> Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	Section 7.1.2.1 and Section 7.1.2.2
		<input checked="" type="checkbox"/> Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	Section 7.1.2.7
		<input checked="" type="checkbox"/> Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	Section 7.3
		Maps and tables	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 7.1
		<input checked="" type="checkbox"/> Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	Figure 7.1
		<input checked="" type="checkbox"/> Maps demonstrating indirect impact zones where applicable	Section 8.2
		Data	
		Digital shape files of:	–
		<input checked="" type="checkbox"/> alternative and final proposal footprint	–
		<input checked="" type="checkbox"/> direct and indirect impact zones	–
		<input checked="" type="checkbox"/> Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	
		<input checked="" type="checkbox"/> Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Section 8.1
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		<input checked="" type="checkbox"/> description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	Section 8.2, Table 8.3
		<input checked="" type="checkbox"/> documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	Section 8.2, Table 8.3
		<input checked="" type="checkbox"/> reporting any limitations or assumptions, etc. made during the assessment	Section 8.2, Table 8.3
		<input checked="" type="checkbox"/> identification of the threatened entities and their habitat likely to be affected	Section 8.2, Table 8.3
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–

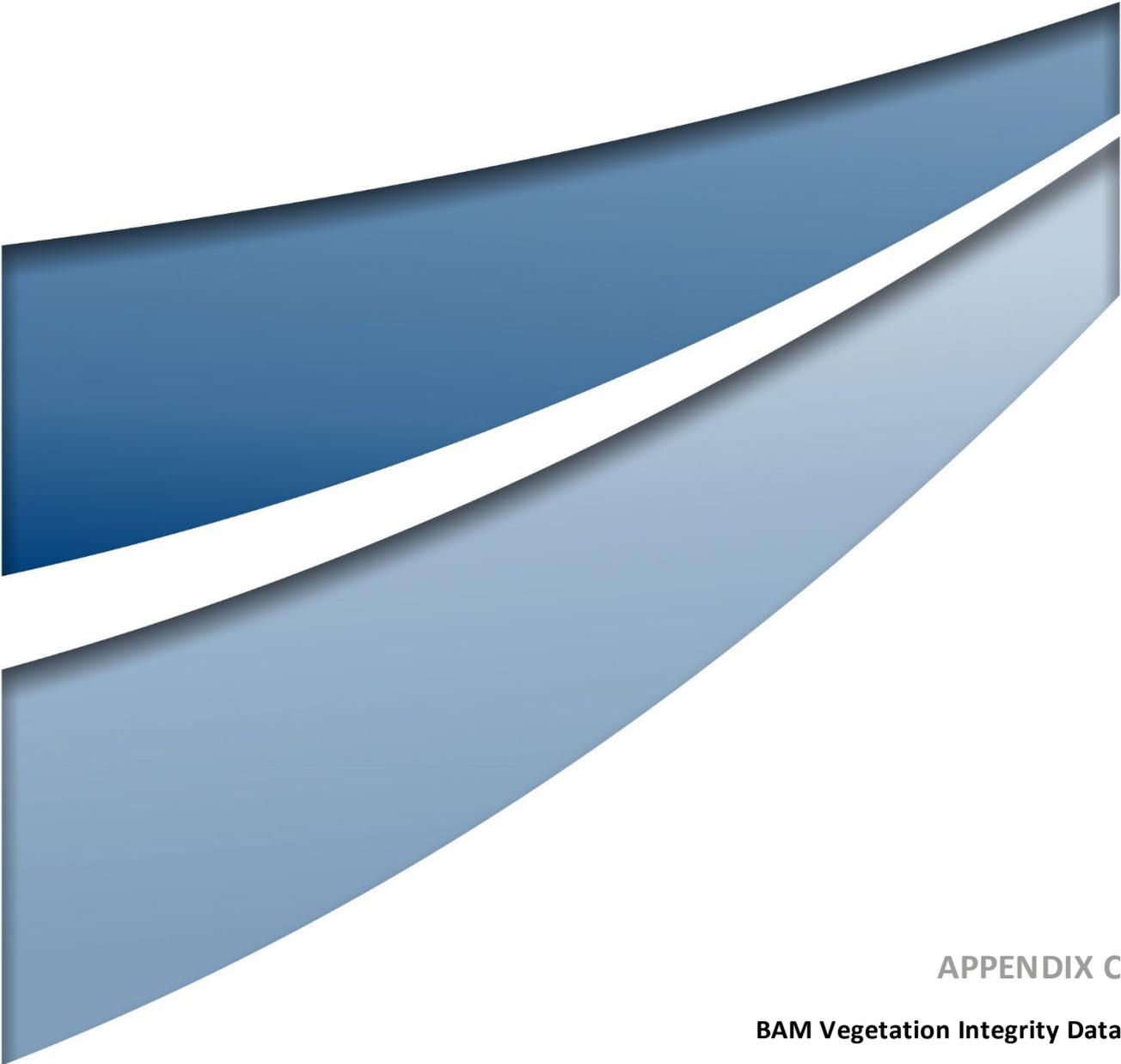
BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		assessment of the nature, extent frequency , duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other features of geological significance	Section 8.3.1
		<input checked="" type="checkbox"/> human-made structures	Section 8.3.2
		<input checked="" type="checkbox"/> non-native vegetation	Section 8.3.3
		<input checked="" type="checkbox"/> connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Section 8.3.5
		<input checked="" type="checkbox"/> movement of threatened species that maintains their life cycle	Section 8.3.5
		<input checked="" type="checkbox"/> water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	Section 8.3.6
		<input type="checkbox"/> assessment of the impacts of wind turbine strikes on protected animals	Not applicable
		<input checked="" type="checkbox"/> assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Section 8.3.7
		<input checked="" type="checkbox"/> evaluate the consequences of prescribed impacts	Section 8.3
		<input checked="" type="checkbox"/> describe impacts that are uncertain	Section 8.5
		<input checked="" type="checkbox"/> document limitations to data, assumptions and predictions	Section 8.3.8
		Maps and tables	
		<input checked="" type="checkbox"/> Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 10.1
		Data	
		N/A	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
		<input checked="" type="checkbox"/> techniques, timing, frequency and responsibility	Table 8.3, Table 8.4
		<input checked="" type="checkbox"/> identify measures for which there is risk of failure	
		<input checked="" type="checkbox"/> evaluate the risk and consequence of any residual impacts	
		<input checked="" type="checkbox"/> document any adaptive management strategy proposed	Table 8.5
		Identification of measures for mitigating impacts related to:	–
		<input checked="" type="checkbox"/> displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	Section 8.4
		<input checked="" type="checkbox"/> indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		<input checked="" type="checkbox"/> mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	
		<input checked="" type="checkbox"/> Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Table 8.5
Maps and tables			
<input checked="" type="checkbox"/> Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 8.4		
Data			
N/A	–		
Impact summary	Chapter 9	Information	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:	–
		<input checked="" type="checkbox"/> addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	Section 9.1.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR		
		<input checked="" type="checkbox"/> for each TEC, report the extent of the TEC in NSW	Section 9.1.1		
		<input checked="" type="checkbox"/> addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	Section 9.1.2		
		<input checked="" type="checkbox"/> for each threatened species, report the population size in NSW	Section 9.1.2		
		<input checked="" type="checkbox"/> documenting assumptions made and/or limitations to information	Section 9		
		<input checked="" type="checkbox"/> documenting all sources of data, information, references used or consulted			
		<input checked="" type="checkbox"/> clearly justifying why any criteria could not be addressed			
		<input checked="" type="checkbox"/> Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 10.1 and Table 10.1, Section 10.2 and Table 10.2		
		<input checked="" type="checkbox"/> Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 10.1.1 – Not applicable		
		<input checked="" type="checkbox"/> Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 10.2		
		Maps and tables			
		<input checked="" type="checkbox"/> Map showing the extent of TECs at risk of an SAII within the subject land	Figure 9.1		
		<input checked="" type="checkbox"/> Map showing location of threatened species at risk of an SAII within the subject land	Figure 9.1		
		Map showing location of:	–		
		<input checked="" type="checkbox"/> impacts requiring offset	Figure 8.1		
		<input checked="" type="checkbox"/> impacts not requiring offset	Table 10.1		
		<input checked="" type="checkbox"/> areas not requiring assessment	Section 10.2		
		Data			
		Digital shape files of:	–		
<input checked="" type="checkbox"/> extent of TECs at risk of an SAII within the subject land	-				

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		<input checked="" type="checkbox"/> location of threatened species at risk of an SAll within the subject land	-
		<input checked="" type="checkbox"/> boundary of impacts requiring offset	-
		<input checked="" type="checkbox"/> boundary of impacts not requiring offset	-
		<input checked="" type="checkbox"/> boundary of areas not requiring assessment	-
		<input checked="" type="checkbox"/> Maps in jpeg format	-
Impact summary	Chapter 10	Information	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	-
		<input checked="" type="checkbox"/> future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H)	Table 10.1
		<input checked="" type="checkbox"/> change in vegetation integrity score (BAM Subsection 8.1.1)	
		<input checked="" type="checkbox"/> number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	
		<input checked="" type="checkbox"/> biodiversity risk weighting for each	Table 10.1 and Table 10.2
		<input checked="" type="checkbox"/> number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 10.2
		Maps and tables	
		<input checked="" type="checkbox"/> Table of PCTs requiring offset and the number of ecosystem credits required	Table 10.1
		<input checked="" type="checkbox"/> Table of threatened species requiring offset and the number of species credits required	Table 10.2
Data			
<input checked="" type="checkbox"/> Submitted proposal in the BAM Calculator	-		

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Biodiversity credit report	Chapter 10	Information	
		☒ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Table 11.1, Table 11.2
		☒ BAM credit report in pdf format	Appendix D
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 11.1
		Data	
		☒ BAM credit report in pdf format	Appendix D



APPENDIX C

BAM Vegetation Integrity Data

1. Appendix C – BAM Plot Data

1.1 FLORA SPECIES LIST

BAM Growth Form Group	Family	Scientific Name	Common Name
Tree (TG)	Casuarinaceae	<i>Allocasuarina luehmannii</i>	Bulloak
Tree (TG)	Fabaceae (Mimosoideae)	<i>Acacia salicina</i>	Cooba
Tree (TG)	Malvaceae	<i>Brachychiton populneus</i>	Kurrajong
Tree (TG)	Myrtaceae	<i>Eucalyptus albens</i>	White Box
Tree (TG)	Myrtaceae	<i>Eucalyptus albens <--> moluccana</i>	
Tree (TG)	Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
Tree (TG)	Oleaceae	<i>Notelaea microcarpa</i>	Native Olive
Shrub (SG)	Asteraceae	<i>Cassinia sifton</i>	
Shrub (SG)	Chenopodiaceae	<i>Atriplex semibaccata</i>	Creeping Saltbush
Shrub (SG)	Chenopodiaceae	<i>Atriplex sp.</i>	
Shrub (SG)	Chenopodiaceae	<i>Maireana microphylla</i>	Small-leaf Bluebush
Shrub (SG)	Chenopodiaceae	<i>Salsola tragus</i>	Buckbush, Soft Rolpoly, Saltwort
Shrub (SG)	Ericaceae	<i>Lissanthe strigosa</i>	Peach Heath
Shrub (SG)	Fabaceae (Caesalpinioideae)	<i>Senna artemisioides subsp. zygophylla</i>	
Shrub (SG)	Fabaceae (Faboideae)	<i>Bossiaea buxifolia</i>	
Shrub (SG)	Fabaceae (Faboideae)	<i>Daviesia genistifolia</i>	Broom Bitter Pea
Shrub (SG)	Fabaceae (Faboideae)	<i>Indigofera adesmiifolia</i>	Tick Indigo
Shrub (SG)	Fabaceae (Faboideae)	<i>Indigofera australis</i>	Australian Indigo
Shrub (SG)	Fabaceae (Mimosoideae)	<i>Acacia paradoxa</i>	Kangaroo Thorn
Shrub (SG)	Fabaceae (Mimosoideae)	<i>Acacia parvipinnula</i>	Silver-stemmed Wattle
Shrub (SG)	Malvaceae	<i>Abutilon oxycarpum</i>	Straggly Lantern-bush
Shrub (SG)	Malvaceae	<i>Commersonia fraseri</i>	Brush Kurrajong
Shrub (SG)	Sapindaceae	<i>Dodonaea viscosa subsp. cuneata</i>	Wedge-leaf Hop-bush
Shrub (SG)	Scrophulariaceae	<i>Eremophila debilis</i>	Amulla
Shrub (SG)	Solanaceae	<i>Solanum brownii</i>	Violet Nightshade
Shrub (SG)	Solanaceae	<i>Solanum cinereum</i>	Narrawa Burr

BAM Growth Form Group	Family	Scientific Name	Common Name
Shrub (SG)	Thymelaeaceae	<i>Pimelea curviflora</i>	Rice Flower
Shrub (SG)	Thymelaeaceae	<i>Pimelea linifolia</i>	Slender Rice Flower
Grass & grasslike (GG)	Cyperaceae	<i>Carex appressa</i>	Tall Sedge
Grass & grasslike (GG)	Cyperaceae	<i>Carex inversa</i>	Knob Sedge
Grass & grasslike (GG)	Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge
Grass & grasslike (GG)	Cyperaceae	<i>Cyperus laevis</i>	
Grass & grasslike (GG)	Cyperaceae	<i>Cyperus sp.</i>	
Grass & grasslike (GG)	Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
Grass & grasslike (GG)	Cyperaceae	<i>Fimbristylis sp.</i>	
Grass & grasslike (GG)	Cyperaceae	<i>Gahnia aspera</i>	Rough Saw-sedge
Grass & grasslike (GG)	Juncaceae	<i>Juncus sp.</i>	
Grass & grasslike (GG)	Juncaceae	<i>Juncus usitatus</i>	
Grass & grasslike (GG)	Lomandraceae	<i>Lomandra filiformis</i>	Wattle Matt-rush
Grass & grasslike (GG)	Lomandraceae	<i>Lomandra filiformis subsp. coriacea</i>	Wattle Matt-rush
Grass & grasslike (GG)	Lomandraceae	<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush
Grass & grasslike (GG)	Lomandraceae	<i>Lomandra sp.</i>	Mat-rush
Grass & grasslike (GG)	Poaceae	<i>Anthosachne scabra</i>	Wheatgrass, Common Wheatgrass
Grass & grasslike (GG)	Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass
Grass & grasslike (GG)	Poaceae	<i>Aristida sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass
Grass & grasslike (GG)	Poaceae	<i>Austrostipa bigeniculata</i>	Yanganbil
Grass & grasslike (GG)	Poaceae	<i>Austrostipa scabra</i>	Speargrass
Grass & grasslike (GG)	Poaceae	<i>Austrostipa sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Austrostipa verticillata</i>	Slender Bamboo Grass
Grass & grasslike (GG)	Poaceae	<i>Bothriochloa decipiens var. decipiens</i>	Pitted Bluegrass
Grass & grasslike (GG)	Poaceae	<i>Bothriochloa macra</i>	Red Grass
Grass & grasslike (GG)	Poaceae	<i>Bothriochloa sp.</i>	Redgrass, Bluegrass
Grass & grasslike (GG)	Poaceae	<i>Bromus sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Chloris truncata</i>	Windmill Grass
Grass & grasslike (GG)	Poaceae	<i>Chloris ventricosa</i>	Tall Chloris
Grass & grasslike (GG)	Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
Grass & grasslike (GG)	Poaceae	<i>Cynodon dactylon</i>	Common Couch
Grass & grasslike (GG)	Poaceae	<i>Dactyloctenium radulans</i>	Button Grass

BAM Growth Form Group	Family	Scientific Name	Common Name
Grass & grasslike (GG)	Poaceae	<i>Dichanthium sericeum</i>	Queensland Bluegrass
Grass & grasslike (GG)	Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass
Grass & grasslike (GG)	Poaceae	<i>Dichelachne sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Digitaria brownii</i>	Cotton Panic Grass
Grass & grasslike (GG)	Poaceae	<i>Digitaria diffusa</i>	Open Summer-grass
Grass & grasslike (GG)	Poaceae	<i>Digitaria divaricatissima</i>	Umbrella Grass
Grass & grasslike (GG)	Poaceae	<i>Digitaria parviflora</i>	Small-flowered Finger Grass
Grass & grasslike (GG)	Poaceae	<i>Digitaria ramularis</i>	Finger Panic Grass
Grass & grasslike (GG)	Poaceae	<i>Digitaria sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass
Grass & grasslike (GG)	Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass
Grass & grasslike (GG)	Poaceae	<i>Elymus sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Enneapogon gracilis</i>	Slender Nineawn
Grass & grasslike (GG)	Poaceae	<i>Enneapogon nigricans</i>	Nine-awn Grass
Grass & grasslike (GG)	Poaceae	<i>Entolasia marginata</i>	Bordered Panic
Grass & grasslike (GG)	Poaceae	<i>Entolasia stricta</i>	Wiry Panic
Grass & grasslike (GG)	Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Grass & grasslike (GG)	Poaceae	<i>Eragrostis elongata</i>	Clustered Lovegrass
Grass & grasslike (GG)	Poaceae	<i>Eragrostis leptostachya</i>	Paddock Lovegrass
Grass & grasslike (GG)	Poaceae	<i>Eragrostis parviflora</i>	Weeping Lovegrass
Grass & grasslike (GG)	Poaceae	<i>Eragrostis sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Eragrostis trachycarpa</i>	
Grass & grasslike (GG)	Poaceae	<i>Eriochloa australiensis</i>	Australian Cupgrass
Grass & grasslike (GG)	Poaceae	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass
Grass & grasslike (GG)	Poaceae	<i>Eriochloa sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Eulalia aurea</i>	Silky Browntop
Grass & grasslike (GG)	Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Grass & grasslike (GG)	Poaceae	<i>Microlaena stipoides var. breviseta</i>	
Grass & grasslike (GG)	Poaceae	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass
Grass & grasslike (GG)	Poaceae	<i>Panicum effusum</i>	Hairy Panic
Grass & grasslike (GG)	Poaceae	<i>Panicum simile</i>	Two-colour Panic
Grass & grasslike (GG)	Poaceae	<i>Paspalidium distans</i>	
Grass & grasslike (GG)	Poaceae	<i>Paspalidium sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Poa labillardierei var. labillardierei</i>	Tussock

BAM Growth Form Group	Family	Scientific Name	Common Name
Grass & grasslike (GG)	Poaceae	<i>Poa sieberiana</i>	Snowgrass
Grass & grasslike (GG)	Poaceae	<i>Poa sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Rytidosperma racemosum</i>	Wallaby Grass
Grass & grasslike (GG)	Poaceae	<i>Rytidosperma sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Rytidosperma tenuius</i>	
Grass & grasslike (GG)	Poaceae	<i>Setaria sp.</i>	
Grass & grasslike (GG)	Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
Grass & grasslike (GG)	Poaceae	<i>Sporobolus sp.</i>	Rat's Tail Couch
Grass & grasslike (GG)	Poaceae	<i>Themeda triandra</i>	
Grass & grasslike (GG)	Poaceae	<i>Tragus australianus</i>	Small Burrgrass
Grass & grasslike (GG)	Poaceae	<i>Urochloa piligera</i>	Hairy Armgrass
Grass & grasslike (GG)	Poaceae	<i>Urochloa sp.</i>	
Forb (FG)	Acanthaceae	<i>Brunoniella pumilio</i>	Dwarf Blue Trumpet
Forb (FG)	Acanthaceae	<i>Rostellularia adscendens</i>	Pink Tongues
Forb (FG)	Amaranthaceae	<i>Alternanthera sp.</i>	Joyweed
Forb (FG)	Anthericaceae	<i>Caesia parviflora</i>	Pale Grass-lily
Forb (FG)	Anthericaceae	<i>Laxmannia gracilis</i>	Slender Wire Lily
Forb (FG)	Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot
Forb (FG)	Apiaceae	<i>Xanthosia pilosa</i>	Woolly Xanthosia
Forb (FG)	Asparagaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla-lily
Forb (FG)	Asparagaceae	<i>Arthropodium sp.</i>	
Forb (FG)	Asparagaceae	<i>Dichopogon fimbriatus</i>	
Forb (FG)	Asparagaceae	<i>Dichopogon sp.</i>	
Forb (FG)	Asphodelaceae	<i>Dianella sp.</i>	
Forb (FG)	Asteraceae	<i>Argyrotegium poliochlorum</i>	
Forb (FG)	Asteraceae	<i>Calotis anthemoides</i>	Cut-leaved Burr-daisy
Forb (FG)	Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-Daisy
Forb (FG)	Asteraceae	<i>Calotis lappulacea</i>	Yellow Burr-daisy
Forb (FG)	Asteraceae	<i>Calotis sp.</i>	
Forb (FG)	Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting
Forb (FG)	Asteraceae	<i>Cotula australis</i>	Common Cotula
Forb (FG)	Asteraceae	<i>Cymbonotus sp.</i>	
Forb (FG)	Asteraceae	<i>Euchiton involucratus</i>	Star Cudweed
Forb (FG)	Asteraceae	<i>Euchiton sp.</i>	
Forb (FG)	Asteraceae	<i>Euchiton sphaericus</i>	Star Cudweed

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Asteraceae	<i>Senecio pinnatifolius</i>	
Forb (FG)	Asteraceae	<i>Senecio sp.</i>	Groundsel, Fireweed
Forb (FG)	Asteraceae	<i>Sigesbeckia australiensis</i>	
Forb (FG)	Asteraceae	<i>Sigesbeckia orientalis subsp. orientalis</i>	Indian Weed
Forb (FG)	Asteraceae	<i>Solenogyne sp.</i>	
Forb (FG)	Asteraceae	<i>Sonchus sp.</i>	Sowthistle
Forb (FG)	Asteraceae	<i>Triptilodiscus pygmaeus</i>	Common Sunray
Forb (FG)	Asteraceae	<i>Vittadinia cuneata</i>	
Forb (FG)	Asteraceae	<i>Vittadinia muelleri</i>	
Forb (FG)	Asteraceae	<i>Vittadinia sp.</i>	Fuzzweed
Forb (FG)	Asteraceae	<i>Xerochrysum sp.</i>	
Forb (FG)	Campanulaceae	<i>Wahlenbergia communis</i>	Tufted Bluebell
Forb (FG)	Campanulaceae	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell
Forb (FG)	Campanulaceae	<i>Wahlenbergia luteola</i>	Bluebell
Forb (FG)	Campanulaceae	<i>Wahlenbergia sp.</i>	Bluebell
Forb (FG)	Campanulaceae	<i>Wahlenbergia stricta</i>	Tall Bluebell
Forb (FG)	Chenopodiaceae	<i>Atriplex spinibractea</i>	Spiny-fruit Saltbush
Forb (FG)	Chenopodiaceae	<i>Dysphania pumilio</i>	Small Crumbweed
Forb (FG)	Chenopodiaceae	<i>Dysphania sp.</i>	
Forb (FG)	Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush
Forb (FG)	Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush
Forb (FG)	Chenopodiaceae	<i>Einadia polygonoides</i>	Knotweed Goosefoot
Forb (FG)	Chenopodiaceae	<i>Einadia sp.</i>	
Forb (FG)	Clusiaceae	<i>Hypericum gramineum</i>	Small St John's Wort
Forb (FG)	Clusiaceae	<i>Hypericum japonicum</i>	
Forb (FG)	Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew
Forb (FG)	Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Forb (FG)	Convolvulaceae	<i>Evolvulus alsinoides</i>	Bindweed
Forb (FG)	Crassulaceae	<i>Crassula sieberiana</i>	Australian Stonecrop
Forb (FG)	Euphorbiaceae	<i>Chamaesyce drummondii</i>	Caustic Weed
Forb (FG)	Fabaceae (Faboideae)	<i>Bossiaea prostrata</i>	
Forb (FG)	Fabaceae (Faboideae)	<i>Hovea linearis</i>	

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Fabaceae (Faboideae)	<i>Zornia dyctiocarpa var. dyctiocarpa</i>	Zornia
Forb (FG)	Geraniaceae	<i>Erodium crinitum</i>	Blue Crowfoot
Forb (FG)	Geraniaceae	<i>Geranium homeanum</i>	
Forb (FG)	Geraniaceae	<i>Geranium solanderi</i>	Native Geranium
Forb (FG)	Geraniaceae	<i>Geranium sp.</i>	
Forb (FG)	Goodeniaceae	<i>Goodenia pinnatifida</i>	Scrambles Eggs
Forb (FG)	Haloragaceae	<i>Haloragis heterophylla</i>	Variable Raspwort
Forb (FG)	Lamiaceae	<i>Mentha satureioides</i>	Native Pennyroyal
Forb (FG)	Linaceae	<i>Linum marginale</i>	Native Flax
Forb (FG)	Malvaceae	<i>Sida cordifolia</i>	
Forb (FG)	Malvaceae	<i>Sida corrugata</i>	Corrugated Sida
Forb (FG)	Malvaceae	<i>Sida cunninghamii</i>	Ridge Sida
Forb (FG)	Malvaceae	<i>Sida sp.</i>	
Forb (FG)	Nyctaginaceae	<i>Boerhavia dominii</i>	Tarvine
Forb (FG)	Onagraceae	<i>Epilobium billardierianum</i>	
Forb (FG)	Onagraceae	<i>Epilobium sp.</i>	
Forb (FG)	Oxalidaceae	<i>Oxalis perennans</i>	
Forb (FG)	Oxalidaceae	<i>Oxalis sp.</i>	
Forb (FG)	Phyllanthaceae	<i>Phyllanthus virgatus</i>	Wiry Spurge
Forb (FG)	Plantaginaceae	<i>Plantago debilis</i>	Shade Plantain
Forb (FG)	Plantaginaceae	<i>Plantago gaudichaudii</i>	Narrow Plantain
Forb (FG)	Plantaginaceae	<i>Plantago sp.</i>	Plantain
Forb (FG)	Plantaginaceae	<i>Plantago varia</i>	
Forb (FG)	Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell
Forb (FG)	Plantaginaceae	<i>Veronica sp.</i>	
Forb (FG)	Polygonaceae	<i>Rumex brownii</i>	Swamp Dock
Forb (FG)	Polygonaceae	<i>Rumex sp.</i>	Dock
Forb (FG)	Portulacaceae	<i>Portulaca oleracea</i>	Pigweed
Forb (FG)	Portulacaceae	<i>Portulaca sp.</i>	
Forb (FG)	Rubiaceae	<i>Asperula conferta</i>	Common Woodruff
Forb (FG)	Rubiaceae	<i>Galium sp.</i>	
Forb (FG)	Rubiaceae	<i>Pomax umbellata</i>	Pomax
Forb (FG)	Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade
Forb (FG)	Solanaceae	<i>Solanum sp.</i>	

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Verbenaceae	<i>Verbena sp.</i>	
Fern (EG)	Ophioglossaceae	<i>Ophioglossum sp.</i>	
Fern (EG)	Pteridaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern
Fern (EG)	Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern
Fern (EG)	Pteridaceae	<i>Cheilanthes sp.</i>	Cloak Fern, Mulga Fern, Rock Fern
Other (OG)	Apocynaceae	<i>Marsdenia viridiflora</i>	Native Pear
Other (OG)	Apocynaceae	<i>Marsdenia viridiflora subsp. viridiflora</i>	Native Pear
Other (OG)	Convolvulaceae	<i>Convolvulus angustissimus</i>	
Other (OG)	Dilleniaceae	<i>Hibbertia scandens</i>	Climbing Guinea Flower
Other (OG)	Fabaceae (Faboideae)	<i>Desmodium sp.</i>	Tick-trefoil
Other (OG)	Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine
Other (OG)	Fabaceae (Faboideae)	<i>Glycine clandestina (broad leaf form)</i>	Scott's Head Broad-Leaved Glycine
Other (OG)	Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine
Other (OG)	Fabaceae (Faboideae)	<i>Grona sp.</i>	
Other (OG)	Fabaceae (Faboideae)	<i>Grona varians</i>	
Other (OG)	Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	False Sarsaparilla
Other (OG)	Fabaceae (Faboideae)	<i>Oxytes brachypoda</i>	Large Tick-trefoil
Other (OG)	Loranthaceae	<i>Amyema sp.</i>	Mistletoe
Exotic (HTE)	Amaranthaceae	<i>Alternanthera pungens</i>	Khaki Weed
Exotic (HTE)	Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs
Exotic (HTE)	Asteraceae	<i>Bidens subalternans</i>	Greater Beggar's Ticks
Exotic (HTE)	Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle
Exotic (HTE)	Asteraceae	<i>Senecio madagascariensis</i>	Fireweed
Exotic (HTE)	Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr
Exotic (HTE)	Clusiaceae	<i>Hypericum perforatum</i>	St. Johns Wort
Exotic (HTE)	Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge
Exotic (HTE)	Iridaceae	<i>Romulea rosea var. australis</i>	Onion Grass
Exotic (HTE)	Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass

BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (HTE)	Poaceae	<i>Chloris gayana</i>	Rhodes Grass
Exotic (HTE)	Poaceae	<i>Paspalum dilatatum</i>	Paspalum
Exotic (HTE)	Polygonaceae	<i>Acetosella vulgaris</i>	Sheep Sorrel
Exotic (non HTE)	Amaranthaceae	<i>Amaranthus powellii</i>	Powell's Amaranth
Exotic (non HTE)	Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed
Exotic (non HTE)	Apiaceae	<i>Cyclospermum leptophyllum</i>	Slender Celery
Exotic (non HTE)	Apocynaceae	<i>Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush
Exotic (non HTE)	Asteraceae	<i>Arctotheca calendula</i>	Capeweed
Exotic (non HTE)	Asteraceae	<i>Aster sp.</i>	
Exotic (non HTE)	Asteraceae	<i>Carduus pycnocephalus</i>	Slender Thistle
Exotic (non HTE)	Asteraceae	<i>Carduus tenuiflorus</i>	Winged Slender Thistle
Exotic (non HTE)	Asteraceae	<i>Carthamus dentatus</i>	Toothed Thistle
Exotic (non HTE)	Asteraceae	<i>Chondrilla juncea</i>	Skeleton Weed
Exotic (non HTE)	Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle
Exotic (non HTE)	Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
Exotic (non HTE)	Asteraceae	<i>Conyza sp.</i>	
Exotic (non HTE)	Asteraceae	<i>Crepis capillaris</i>	Smooth Hawksbeard
Exotic (non HTE)	Asteraceae	<i>Gamochaeta calviceps</i>	Cudweed
Exotic (non HTE)	Asteraceae	<i>Gamochaeta purpurea</i>	Purple Cudweed
Exotic (non HTE)	Asteraceae	<i>Gamochaeta sp.</i>	
Exotic (non HTE)	Asteraceae	<i>Hypochaeris radicata</i>	Catsear
Exotic (non HTE)	Asteraceae	<i>Hypochaeris sp.</i>	
Exotic (non HTE)	Asteraceae	<i>Lactuca saligna</i>	Willow-leaved Lettuce
Exotic (non HTE)	Asteraceae	<i>Lactuca serriola</i>	Prickly Lettuce
Exotic (non HTE)	Asteraceae	<i>Schkuhria pinnata</i>	Dwarf Marigold
Exotic (non HTE)	Asteraceae	<i>Schkuhria pinnata var. abrotanoides</i>	Dwarf Marigold
Exotic (non HTE)	Asteraceae	<i>Senecio vulgaris</i>	
Exotic (non HTE)	Asteraceae	<i>Silybum marianum</i>	Variegated Thistle
Exotic (non HTE)	Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle
Exotic (non HTE)	Asteraceae	<i>Tagetes minuta</i>	Stinking Roger
Exotic (non HTE)	Asteraceae	<i>Taraxacum officinale</i>	Dandelion
Exotic (non HTE)	Boraginaceae	<i>Echium plantagineum</i>	Patterson's Curse
Exotic (non HTE)	Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse

BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (non HTE)	Brassicaceae	<i>Lepidium africanum</i>	Common Peppercross
Exotic (non HTE)	Cactaceae	<i>Opuntia stricta</i>	Common Prickly Pear
Exotic (non HTE)	Caryophyllaceae	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort, Brazilian Whitlow
Exotic (non HTE)	Caryophyllaceae	<i>Petrorhagia dubia</i>	
Exotic (non HTE)	Caryophyllaceae	<i>Petrorhagia nanteuillii</i>	Proliferous Pink
Exotic (non HTE)	Caryophyllaceae	<i>Petrorhagia sp.</i>	
Exotic (non HTE)	Caryophyllaceae	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed
Exotic (non HTE)	Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed
Exotic (non HTE)	Chenopodiaceae	<i>Chenopodium album</i>	Fat Hen
Exotic (non HTE)	Cyperaceae	<i>Cyperus aggregatus</i>	
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Medicago laciniata</i>	Cut-leaved Medic
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Medicago minima</i>	Woolly Burr Medic
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Medicago sp.</i>	
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Medicago truncatula</i>	Barrel Medic
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Trifolium arvense</i>	Haresfoot Clover
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Trifolium campestre</i>	Hop Clover
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Trifolium sp.</i>	
Exotic (non HTE)	Fabaceae (Faboideae)	<i>Trifolium subterraneum</i>	Subterranean Clover
Exotic (non HTE)	Gentianaceae	<i>Centaurium erythraea</i>	Common Centaury
Exotic (non HTE)	Geraniaceae	<i>Geranium molle subsp. molle</i>	Cranesbill Geranium
Exotic (non HTE)	Lamiaceae	<i>Marrubium vulgare</i>	White Horehound
Exotic (non HTE)	Lamiaceae	<i>Salvia reflexa</i>	Mintweed
Exotic (non HTE)	Lamiaceae	<i>Salvia verbenaca</i>	Vervain
Exotic (non HTE)	Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow
Exotic (non HTE)	Malvaceae	<i>Malva parviflora</i>	Small-flowered Mallow
Exotic (non HTE)	Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow
Exotic (non HTE)	Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne

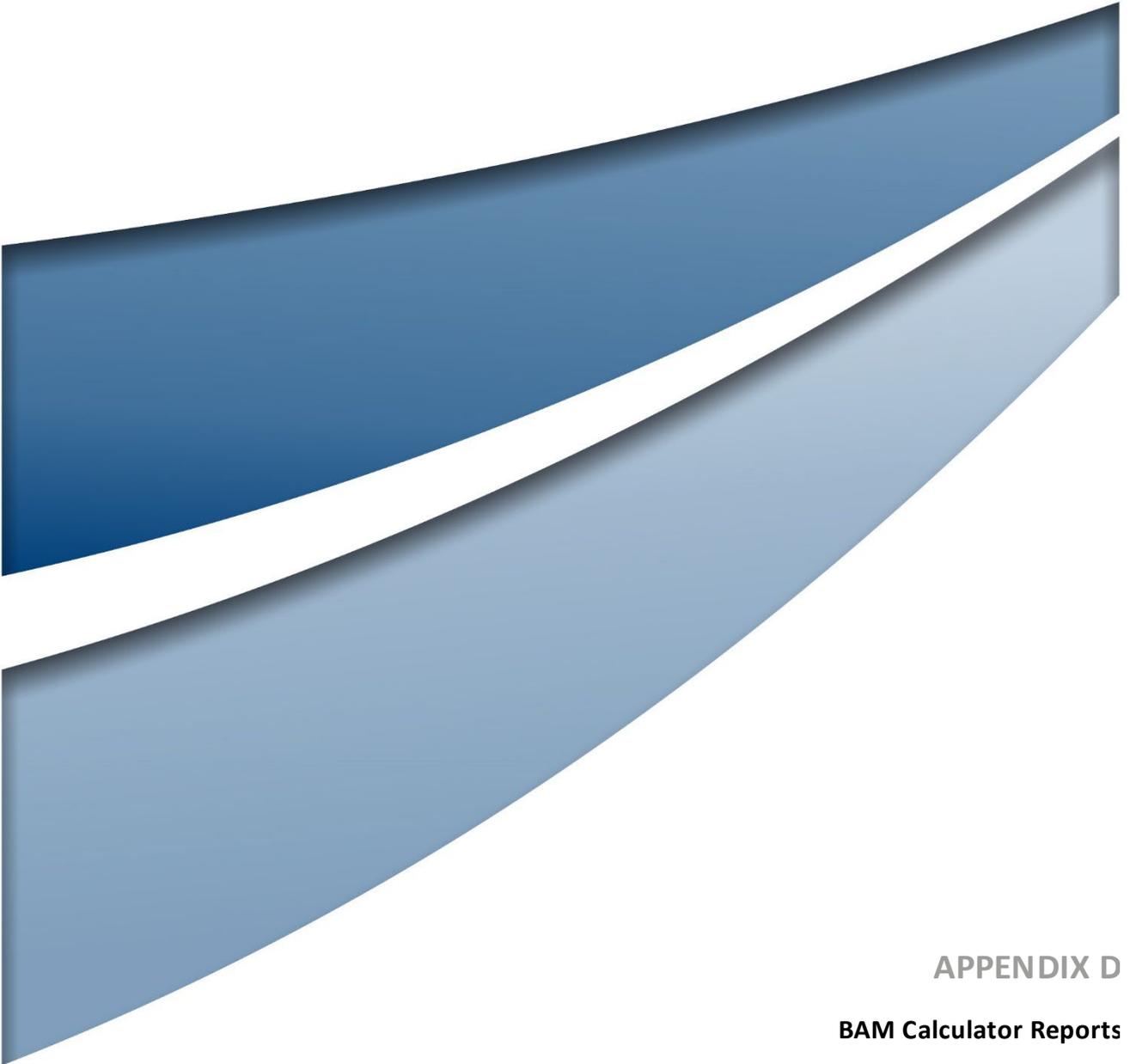
BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (non HTE)	Oxalidaceae	<i>Oxalis corniculata</i>	Creeping Oxalis
Exotic (non HTE)	Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues
Exotic (non HTE)	Poaceae	<i>Aira sp.</i>	
Exotic (non HTE)	Poaceae	<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
Exotic (non HTE)	Poaceae	<i>Avena sativa</i>	Oats
Exotic (non HTE)	Poaceae	<i>Avena sp.</i>	Oats
Exotic (non HTE)	Poaceae	<i>Bromus catharticus</i>	Prairie Grass
Exotic (non HTE)	Poaceae	<i>Bromus hordeaceus</i>	Soft Brome
Exotic (non HTE)	Poaceae	<i>Chloris virgata</i>	Feathertop Rhodes Grass
Exotic (non HTE)	Poaceae	<i>Digitaria sanguinalis</i>	Crab Grass
Exotic (non HTE)	Poaceae	<i>Echinochloa crus-galli</i>	Barnyard Grass
Exotic (non HTE)	Poaceae	<i>Eleusine indica</i>	Crowsfoot Grass
Exotic (non HTE)	Poaceae	<i>Eleusine tristachya</i>	Goose Grass
Exotic (non HTE)	Poaceae	<i>Eragrostis cilianensis</i>	Stinkgrass
Exotic (non HTE)	Poaceae	<i>Holcus lanatus</i>	Yorkshire Fog
Exotic (non HTE)	Poaceae	<i>Hordeum hystrix</i>	Mediterranean Barley Grass
Exotic (non HTE)	Poaceae	<i>Hordeum leporinum</i>	Barley Grass
Exotic (non HTE)	Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass
Exotic (non HTE)	Poaceae	<i>Setaria parviflora</i>	
Exotic (non HTE)	Poaceae	<i>Urochloa panicoides</i>	Urochloa Grass
Exotic (non HTE)	Poaceae	<i>Vulpia bromoides</i>	Squirrel Tail Fesque
Exotic (non HTE)	Polygonaceae	<i>Polygonum arenastrum</i>	Wireweed
Exotic (non HTE)	Polygonaceae	<i>Polygonum aviculare</i>	Wireweed
Exotic (non HTE)	Polygonaceae	<i>Rumex crispus</i>	Curled Dock
Exotic (non HTE)	Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
Exotic (non HTE)	Rubiaceae	<i>Richardia stellaris</i>	
Exotic (non HTE)	Scrophulariaceae	<i>Verbascum sp.</i>	
Exotic (non HTE)	Scrophulariaceae	<i>Verbascum virgatum</i>	Twiggy Mullein
Exotic (non HTE)	Solanaceae	<i>Datura ferox</i>	Fierce Thornapple
Exotic (non HTE)	Solanaceae	<i>Solanum chenopodioides</i>	Whitetip Nightshade
Exotic (non HTE)	Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade
Exotic (non HTE)	Urticaceae	<i>Urtica urens</i>	Small Nettle
Exotic (non HTE)	Verbenaceae	<i>Verbena bonariensis</i>	Purpletop
Exotic (non HTE)	Verbenaceae	<i>Verbena quadrangularis</i>	

1.2 Vegetation Integrity Plot Data

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function										
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
P2	1661	100	1_Scattered	56	228426.5	6426009	185	4	3	9	11	1	5	3.9	0.5	81.8	5.5	0.1	2.3	4	0	3	43.5	0	1	1	1	1	1	1.1
P23	1661	100	1_Scattered	56	228383.5	6425874	188	1	2	11	12	1	1	45	1.1	18.5	7.9	0.1	0.3	3	1	73	1	0	0	0	0	1	0	0.6
P26	1661	100	1_Scattered	56	227892.2	6426407	262	3	6	21	17	1	3	8.1	1.2	65.5	2.1	0.1	0.3	1	1	48.4	73	0	1	1	1	1	1	0.6
P43	1661	100	1_Scattered	56	225287.1	6424393	37	2	7	22	16	1	3	15.3	5	85.5	27.6	0.1	0.5	2	1	38	7	0	0	0	1	1	1	0.3
P1	1661	100	2_Mod_Low_DNG	56	228642	6427140	278	0	1	13	8	1	1	0	0.1	94.7	3.7	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0.8
P4	1661	100	2_Mod_Low_DNG	56	228450.9	6425834	164	0	0	22	14	1	1	0	0	82.8	2	0.1	0.1	0	0	6.2	0	0	0	0	0	0	0	0.9
P5	1661	100	2_Mod_Low_DNG	56	228867.2	6427118	72	0	1	14	9	1	0	0	0.1	91.7	0.9	0.1	0	0	0	95	0	0	0	0	0	0	0	0.1
P27	1661	100	2_Mod_Low_DNG	56	225258.7	6424301	88	0	0	7	7	0	2	0	0	91.6	0.8	0	0.2	0	0	19	0	0	0	0	0	0	0	1.2
P30	1661	100	2_Mod_Low_DNG	56	227863.1	6426467	222	0	0	17	8	1	1	0	0	82.3	0.8	0.1	0.1	0	0	5	0	0	0	0	0	0	0	0.6
P50	483	100	2_Mod_Low_DNG	56	228495	6427128	15	0	1	10	8	1	1	0	0.1	35.8	6.1	0.2	0.1	0	0	0.4	0	0	0	0	0	0	0	5
P59	483	100	1661_2_Mod_Low_DNG	56	228270.7	6426023	340	0	0	9	2	0	1	0	0	79	0.3	0	0.1	0	0	41	0	0	0	0	0	0	0	15.6
P60	483	100	2_Mod_Low_DNG	56	228024.4	6426495	0	0	0	7	3	0	1	0	0	26.8	0.3	0	0.2	0	0	13	0	0	0	0	0	0	0	4
P76	483	100	2_Mod_Low_DNG	56	225409.6	6424192	40	0	0	10	7	1	0	0	0	65	0.7	0.1	0	0	0	11	0	0	0	0	0	0	0	31.5
P77	483	100	2_Mod_Low_DNG	56	225184.5	6424191	240	0	0	11	5	1	0	0	0	18.5	3.8	0.1	0	0	0	11	0	0	0	0	0	0	0	31.1
P78	483	100	2_Mod_Low_DNG	56	224775.8	6424258	330	0	0	12	15	1	3	0	0	96.3	10.4	0.1	2.3	0	0	10	0	0	0	0	0	0	0	1.5
P3	1661	100	3_Low_DNG	56	224548.7	6424016	314	0	0	16	11	1	2	0	0	94.2	1.9	0.1	0.3	0	0	0	0	0	0	0	0	0	0	0.2
P28	483	100	3_Low_DNG	56	226033.6	6423362	123	0	0	3	2	0	0	0	0	78	0.8	0	0	0	0	9	0	0	0	0	0	0	0	2
P29	483	100	3_Low_DNG	56	226329.7	6423228	355	0	0	6	1	0	0	0	0	29.4	0.1	0	0	0	0	0.2	0	0	0	0	0	0	0	0.6
P71	483	100	3_Low_DNG	56	226119.8	6423120	0	0	0	3	0	0	0	0	0	90.1	0	0	0	0	0	8	0	0	0	0	0	0	0	0.6
P72	483	100	3_Low_DNG	56	225932.5	6422877	80	0	0	15	10	1	2	0	0	82.6	6.8	0.1	0.2	0	0	2.6	0	0	0	0	0	0	0	13.2
P18	483	100	1_Scattered	56	225588.1	6424282	57	1	0	13	9	0	2	20	0	43.5	2.3	0	0.3	1	0	10.4	0	0	0	0	0	1	1	1
P20	483	100	1_Scattered	56	228024	6422427	167	2	4	18	16	2	2	37	1.3	107.4	3.8	0.2	3.2	3	0	67	11	0	1	0	0	1	1	0.2
P21	483	100	1_Scattered	56	226464.9	6425744	277	2	0	8	12	1	1	12	0	47.4	2.3	0.1	3	3	1	4	5	0	0	0	0	1	0	2.5
P22	483	100	1_Scattered	56	228239	6427124	185	2	6	22	12	1	5	5.3	1.1	35.1	1.5	0.1	0.5	0	0	17.8	5	1	1	0	1	0	1	0.2
P45	483	100	1_Scattered	56	225310.9	6424567	350	3	1	5	5	0	1	21	0.1	85.1	1	0	0.1	5	4	17	38	0	1	1	1	1	0	1.2
P6	483	100	2_Mod_DNG	56	228314.3	6427010	103	0	0	11	6	1	1	0	0	95.8	1.4	0.1	0.1	0	0	2.4	0	0	0	0	0	0	0	0.3
P8	483	100	2_Mod_DNG	56	226708.4	6425077	237	0	0	13	10	0	2	0	0	68.5	20.9	0	0.2	0	0	0	0	0	0	0	0	0	0	0.4
P44	483	100	2_Mod_DNG	56	225015.2	6424457	270	0	0	9	6	0	0	0	0	36.4	7.8	0	0	0	0	39	0	0	0	0	0	0	0	8
P51	483	100	2_Mod_DNG	56	228469	6427025	40	0	0	7	8	0	1	0	0	37.2	1.2	0	0.1	0	0	15.2	0	0	0	0	0	0	0	5.1
P52	483	100	2_Mod_DNG	56	228624.7	6426942	20	0	0	11	11	0	2	0	0	62.8	4.4	0	0.2	0	0	15	0	0	0	0	0	0	0	1.7
P61	483	100	2_Mod_DNG	56	227518	6425121	0	0	0	6	4	0	1	0	0	56.4	5.7	0	0.1	0	0	15	0	0	0	0	0	0	0	2.1
P62	483	100	2_Mod_DNG	56	228278.1	6425185	35	0	0	8	9	0	0	0	0	92.1	2.9	0	0	0	0	25	0	0	0	0	0	0	0	0.7
P63	483	100	2_Mod_DNG	56	228526.3	6424994	70	0	0	10	9	0	2	0	0	90.6	2.7	0	0.2	0	0	22	0	0	0	0	0	0	0	1.1

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function										
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
P64	483	100	2_Mod_DNG	56	228679.1	6425212	35	0	0	12	8	1	3	0	0	99.1	3.1	0.1	0.3	0	0	29	0	0	0	0	0	0	0	0.6
P65	483	100	2_Mod_DNG	56	227007.8	6426219	50	0	0	5	3	0	0	0	0	10.8	10.2	0	0	0	0	27	0	0	0	0	0	0	0	0.4
P66	483	100	2_Mod_DNG	56	227057.4	6425677	60	0	2	8	6	0	3	0	1.1	90.6	4.5	0	0.4	0	0	34	0	0	0	0	0	0	0	2.6
P67	483	100	2_Mod_DNG	56	226510	6424496	100	0	0	9	9	0	3	0	0	91.2	2.5	0	0.3	0	0	17	0	0	0	0	0	0	0	1.4
P68	483	100	2_Mod_DNG	56	226460	6423727	225	0	1	9	7	1	2	0	0.1	101	2.2	0.1	0.2	0	0	16	0	0	0	0	0	0	0	5.3
P69	483	100	2_Mod_DNG	56	226377.7	6425289	290	0	0	9	13	0	3	0	0	55.8	5.8	0	0.6	0	0	13	0	0	0	0	0	0	0	0.5
P79	483	100	2_Mod_DNG	56	224768	6424761	195	0	1	14	9	1	1	0	0.1	77.8	22.5	0.1	0.1	0	0	8	3	0	0	0	0	0	0	0.3
P80	483	100	2_Mod_DNG	56	225100.3	6424583	80	0	0	7	4	0	0	0	0	71.1	8.3	0	0	0	0	17	0	0	0	0	0	0	0	0.4
P81	483	100	2_Mod_DNG	56	224908.5	6424511	90	0	0	9	7	1	0	0	0	28.1	5.6	0.5	0	0	0	14	0	0	0	0	0	0	0	1.8
P82	483	100	2_Mod_DNG	56	224680.3	6424430	250	0	1	17	14	1	1	0	0.1	123.2	22.8	0.1	0.1	0	0	16	0	0	0	0	0	0	0	0.1
P7	483	100	3_Mod_Low_DNG	56	227864.6	6425887	239	0	1	18	8	1	3	0	0.7	89.8	0.8	0.1	0.3	0	0	3.4	0	0	0	0	0	0	0	0.6
P9	483	100	3_Mod_Low_DNG	56	228601.6	6424339	290	0	0	15	8	0	1	0	0	121.1	3.3	0	0.1	0	0	4.4	0	0	0	0	0	0	0	0.6
P10	483	100	3_Mod_Low_DNG	56	227672.3	6422533	14	0	0	13	10	0	2	0	0	61.1	3.8	0	1.5	0	0	4.8	0	0	0	0	0	0	0	1.4
P11	483	100	3_Mod_Low_DNG	56	225740.8	6422886	144	0	1	12	10	0	2	0	0.1	89	5.9	0	0.2	0	0	0	0	0	0	0	0	0	0	0.6
P16	483	100	3_Mod_Low_DNG	56	227437.7	6423409	0	0	0	9	8	0	2	0	0	89.1	0.8	0	4.1	0	0	7.4	0	0	0	0	0	0	0	0.2
P17	483	100	3_Mod_Low_DNG	56	227502.4	6423918	10	0	0	9	10	1	2	0	0	92	1	0.1	0.2	0	0	5	0	0	0	0	0	0	0	0.1
P34	483	100	3_Mod_Low_DNG	56	227973.6	6421934	9	0	0	22	9	2	3	0	0	97.8	1.8	0.2	0.3	0	0	1.2	0	0	0	0	0	0	0	0.3
P36	483	100	3_Mod_Low_DNG	56	227783.1	6424666	353	0	0	7	11	0	1	0	0	100.7	1.1	0	0.2	0	0	2.4	0	0	0	0	0	0	0	0.2
P37	483	100	3_Mod_Low_DNG	56	227319.4	6424742	342	0	0	6	8	0	2	0	0	77.6	2.6	0	0.2	0	0	0	0	0	0	0	0	0	0	0.2
P41	483	100	3_Mod_Low_DNG	56	228193.9	6426749	116	0	1	11	7	0	1	0	0.1	33.4	25.6	0	0.1	0	0	0	0	0	0	0	0	0	0	0.5
P53	483	100	3_Mod_Low_DNG	56	228603.7	6426787	145	0	1	6	6	0	0	0	0.1	26.2	2.6	0	0	0	0	7	0	0	0	0	0	0	0	5.1
P55	483	100	3_Mod_Low_DNG	56	228060.7	6426930	215	0	0	11	1	1	0	0	0	39.7	0.1	0.1	0	0	0	8	0	0	0	0	0	0	0	10.5
P56	483	100	3_Mod_Low_DNG	56	227814.9	6426644	350	0	1	12	5	0	0	0	0.3	78.9	1.7	0	0	0	0	6.2	0	0	0	0	0	0	0	1.6
P57	483	100	3_Mod_Low_DNG	56	228393.8	6426547	260	0	0	11	6	0	2	0	0	64.9	1.5	0	0.2	0	0	6.2	0	0	0	0	0	0	0	21.3
P58	483	100	3_Mod_Low_DNG	56	228036.2	6426101	5	0	0	5	3	1	1	0	0	89	0.4	0.1	0.1	0	0	11	0	0	0	0	0	0	0	10.2
P70	483	100	3_Mod_Low_DNG	56	227444.7	6422931	100	0	1	12	12	1	3	0	0.2	113	10.4	0.1	0.3	0	0	1.8	0	0	0	0	0	0	0	0.2
P73	483	100	3_Mod_Low_DNG	56	225635.6	6423431	90	0	0	10	17	1	3	0	0	105.5	15.6	0.1	1.2	0	0	2.4	0	0	0	0	0	0	0	0.3
P74	483	100	483_3_Mod_Low_DNG	56	225702.4	6423110	170	0	0	6	7	0	2	0	0	83	2.8	0	0.2	0	0	9	0	0	0	0	0	0	0	27.4
P75	483	100	3_Mod_Low_DNG	56	225668.4	6422753	80	0	2	13	9	1	2	0	1.1	95.1	7.1	0.1	0.2	0	0	7.4	0	0	0	0	0	0	0	0.1
P15	483	100	4_Low_DNG	56	227011.5	6422634	355	0	1	11	13	1	2	0	0.1	65.4	4.5	0.1	2	0	0	2	0	0	0	0	0	0	0	2.2
P38	483	100	4_Low_DNG	56	227324.4	6424382	346	0	0	7	7	0	1	0	0	9.4	70.7	0	0.1	0	0	0.8	0	0	0	0	0	0	0	0.2
P39	483	100	4_Low_DNG	56	227203.7	6423654	264	0	0	4	6	0	0	0	0	15.5	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0.3
P40	483	100	4_Low_DNG	56	226953.4	6423192	170	0	0	4	6	0	0	0	0	0.5	0.6	0	0	0	0	1.2	0	0	0	0	0	0	0	75.2
P42	483	100	4_Low_DNG	56	228361.4	6426378	100	0	0	2	8	0	0	0	0	0.2	10.6	0	0	0	0	0.4	0	0	0	0	0	0	0	2.2
P46	483	100	4_Low_DNG	56	224581.2	6424648	260	0	0	3	4	0	0	0	0	2.4	1.2	0	0	0	0	7	0	0	0	0	0	0	0	0.2

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function												
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics		
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79				
P54	483	100	4_Low_DNG	56	228369.5	6426177	330	0	0	2	2	0	0	0	0	2.1	0.3	0	0	0	0	0	0	32	0	0	0	0	0	0	0	20
P83	483	100	4_Low_DNG	56	224427	6424801	80	0	1	9	11	0	0	0	0.1	21.1	11.8	0	0	0	0	0	4.2	0	0	0	0	0	0	0	0.4	
P84	483	100	4_Low_DNG	56	224381.3	6424534	350	0	0	7	8	0	0	0	0	61.2	2	0	0	0	0	0	1.4	0	0	0	0	0	0	0	5.1	
P85	483	100	4_Low_DNG	56	227940.2	6426136	270	0	1	6	2	0	0	0	0.1	8.6	0.2	0	0	0	0	0	6.2	0	0	0	0	0	0	0	5	



APPENDIX D

BAM Calculator Reports

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00032861/BAAS17099/22/00032862	Goulburn River Solar Farm	14/04/2023
Assessor Name	Report Created	BAM Data version *
Jacob Manners	02/05/2023	58
Assessor Number	BAM Case Status	Date Finalised
BAAS17099	Finalised	02/05/2023
Assessment Revision	Assessment Type	
9	Major Projects	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Ecosystem credits

Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

4	483_3_Mo d_Low_DN G	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	12.4	12.4	308.	Population 4 size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
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5	483_2_Mo d_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	33.1	33.1	168. Population 5 size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	3490
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6	483_4_Low_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	9.9	9.9	199.1	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
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7	483_1_Scattered	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	78	78.0	23.6	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	1152
											Subtotal	4642
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin												
1	1661_2_Mod_Low_DNG	Not a TEC	13.2	13.2	36.8	PCT Cleared - 50%	High Sensitivity to Gain			1.75		0
2	1661_1_Scattered	Not a TEC	51.1	51.1	6.1	PCT Cleared - 50%	High Sensitivity to Gain			1.75		136

3	1661_3_Low_DNG	Not a TEC	3.3	3.3	53.2	PCT Cleared - 50%	High Sensitivity to Gain		1.75	0
									Subtotal	136
									Total	4778

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAIL	Species credits
<i>Anthochaera phrygia / Regent Honeyeater (Fauna)</i>									
483_1_Scattered		78.0	78.0	16.9		Critically Endangered	Critically Endangered	True	988
1661_2_Mod_Low_DNG		13.2	13.2	3.4		Critically Endangered	Critically Endangered	True	34
1661_1_Scattered		51.1	51.1	4		Critically Endangered	Critically Endangered	True	155
1661_3_Low_DNG		3.3	3.3	0.44		Critically Endangered	Critically Endangered	True	1
483_3_Mod_Low_DNG		12.4	12.4	5.9		Critically Endangered	Critically Endangered	True	54
483_2_Mod_DNG		33.1	33.1	11.9		Critically Endangered	Critically Endangered	True	296
483_4_Low_DNG		9.9	9.9	2.4		Critically Endangered	Critically Endangered	True	18

								Subtotal	1546
<i>Ninox connivens / Barking Owl (Fauna)</i>									
483_2_Mod_DN G	33.1	33.1	0.01			Vulnerable	Not Listed	False	1
483_4_Low_DN G	9.9	9.9	1.2			Vulnerable	Not Listed	False	6
								Subtotal	7



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00032861/BAAS17099/22/00032862	Goulburn River Solar Farm	14/04/2023
Assessor Name	Assessor Number	BAM Data version *
Jacob Manners	BAAS17099	58
Proponent Names	Report Created	BAM Case Status
	02/05/2023	Finalised
Assessment Revision	Assessment Type	Date Finalised
9	Major Projects	02/05/2023

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley



BAM Biodiversity Credit Report (Like for like)

Species

Anthochaera phrygia / Regent Honeyeater

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Assessment Id

00032861/BAAS17099/22/00032862

Proposal Name

Goulburn River Solar Farm

Page 2 of 11



BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	96.1	136	0	136
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	699.6	1152	3490	4642

483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267,	-	483_3_Mod_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



BAM Biodiversity Credit Report (Like for like)

	<p>268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>					
	<p>White Box - Yellow Box - Blakely's Red Gum</p>		<p>483_2_Mod_D NG</p>	<p>No</p>	<p>3490</p>	<p>Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and</p>



BAM Biodiversity Credit Report (Like for like)

	<p>Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla</p> <p>This includes PCT's:</p> <p>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331,</p>				<p>Yengo.</p> <p>or</p> <p>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Like for like)

	<p>1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>				
	<p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437,</p>		<p>483_4_Low_DN G</p>	<p>No</p>	<p>0 Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>

BAM Biodiversity Credit Report (Like for like)

	<p>451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>					
	<p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin,</p>		<p>483_1_Scattered</p>	<p>Yes</p>	<p>1152</p>	<p>Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>



BAM Biodiversity Credit Report (Like for like)

	<p>South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415,</p>					
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BAM Biodiversity Credit Report (Like for like)

	3533, 4147, 4149, 4150					
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_2_Mod_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	<p>Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153</p>	<p>Western Slopes Dry Sclerophyll Forests >=50% and <70%</p>	<p>1661_1_Scattered</p>	<p>Yes</p>	<p>136</p>	<p>Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
	<p>Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153</p>	<p>Western Slopes Dry Sclerophyll Forests >=50% and <70%</p>	<p>1661_3_Low_DNG</p>	<p>No</p>	<p>0</p>	<p>Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Anthochaera phrygia / Regent Honeyeater	483_1_Scattered, 1661_2_Mod_Low_DNG, 1661_1_Scattered, 1661_3_Low_DNG, 483_3_Mod_Low_DNG, 483_2_Mod_DNG, 483_4_Low_DNG	45.0	1546.00
Ninox connivens / Barking Owl	483_2_Mod_DNG, 483_4_Low_DNG	1.2	7.00

Credit Retirement Options

Like-for-like credit retirement options

Anthochaera phrygia / Regent Honeyeater	Spp	IBRA subregion
	Anthochaera phrygia / Regent Honeyeater	Any in NSW
Ninox connivens / Barking Owl	Spp	IBRA subregion
	Ninox connivens / Barking Owl	Any in NSW

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00032861/BAAS17099/22/00032862	Goulburn River Solar Farm	14/04/2023
Assessor Name	Assessor Number	BAM Data version *
Jacob Manners	BAAS17099	58
Proponent Name(s)	Report Created	BAM Case Status
	02/05/2023	Finalised
Assessment Revision	Assessment Type	Date Finalised
9	Major Projects	02/05/2023

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley
Species		
Anthochaera phrygia / Regent Honeyeater		

Additional Information for Approval

PCT Outside Ibra Added
None added

PCTs With Customized Benchmarks

PCT
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	96.1	136	0	136.00
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	699.6	1152	3490	4642.00

483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the	-	483_3_Mod_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100

BAM Biodiversity Credit Report (Variations)

	<p>NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla</p> <p>This includes PCT's:</p> <p>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533,</p>					<p>kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Variations)

	<p>4147, 4149, 4150</p> <p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla</p> <p>This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611,</p>	-	483_2_Mod _DNG	No	3490	<p>Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo.</p> <p>or</p> <p>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Variations)

	<p>1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>				
	<p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840,</p>	-	483_4_Low _DNG	No	<p>0 Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>

BAM Biodiversity Credit Report (Variations)

	<p>847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>				
	<p>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511,</p>	-	483_1_Scatered	Yes	1152 Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

	528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_2_Mo d_Low_DN G	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_1_Scattered	Yes	136	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_3_Low_DNG	No	0	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Variation options					
Formation	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Variations)

Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_2_Mod_Low_DNG	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_1_Scattered	Yes (including artificial)	136	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_3_Low_DNG	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Anthochaera phrygia / Regent Honeyeater	483_1_Scattered, 1661_2_Mod_Low_DNG, 1661_1_Scattered, 1661_3_Low_DNG, 483_3_Mod_Low_DNG, 483_2_Mod_DNG, 483_4_Low_DNG	45.0	1546.00
Ninox connivens / Barking Owl	483_2_Mod_DNG, 483_4_Low_DNG	1.2	7.00

Credit Retirement Options Like-for-like options

Anthochaera phrygia/ Regent Honeyeater	Spp	IBRA region
	Anthochaera phrygia/ Regent Honeyeater	Any in NSW
<i>Note: Variation rules do not apply for Critically Endangered species and impacts on Commonwealth listed entities that are a controlled action.</i>		
Ninox connivens/ Barking Owl	Spp	IBRA region
	Ninox connivens/ Barking Owl	Any in NSW
	Variation options	
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below
Fauna	Vulnerable	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Plant community types (PCT) & ecological communities

Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	BC Act listing status	EPBC Act listing status	Action	Delete
Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	1661 - Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	50	Not a TEC			ADD VEG ZONE Default benchmarks modified	

Select type:

Tree (5) **Shrub (17)** **Grass & grass like (9)** **Forb (9)** **Fern (2)** **Other (3)**

Select type:

Tree (69) **Shrub (70)** **Grass & grass like (22)** **Forb (6)** **Fern (1)** **Other (1)**

Select type:

Number of large trees (1) **Stem size class (4)** **Length of fallen logs (55)** **Regeneration stems (Present)** **Litter cover (63)**

Plant community types (PCT) & ecological communities

Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	BC Act listing status	EPBC Act listing status	Action	Delete
Grassy Woodlands	Western Slopes Grassy Woodlands	483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	90	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	Not Listed	ADD VEG ZONE Default benchmarks modified	

Select type:

Tree (4) **Shrub (6)** **Grass & grass like (10)** **Forb (13)** **Fern (1)** **Other (3)**

Select type:

Tree (21) **Shrub (5)** **Grass & grass like (45)** **Forb (8)** **Fern (0)** **Other (1)**

Select type:

Number of large trees (2) **Stem size class (4)** **Length of fallen logs (34)** **Regeneration stems (Present)** **Litter cover (35)**

